US011515458B2

(12) **United States Patent**
Marutani

(10) **Patent No.: US 11,515,458 B2**
(45) **Date of Patent: Nov. 29, 2022**

(54) **LIGHT EMITTING DEVICE, RESIN-ATTACHED LEAD FRAME, AND METHODS OF MANUFACTURING THE SAME**

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(72) Inventor: **Yukitoshi Marutani**, Anan (JP)

(73) Assignee: **NICHIA CORPORATION**, Anan (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 170 days.

(21) Appl. No.: **17/136,535**

(22) Filed: **Dec. 29, 2020**

(65) **Prior Publication Data**

US 2021/0119097 A1 Apr. 22, 2021

Related U.S. Application Data

(63) Continuation of application No. 16/392,106, filed on Apr. 23, 2019, now Pat. No. 10,910,537.

(30) **Foreign Application Priority Data**

Apr. 23, 2018 (JP) JP2018-082516

(51) **Int. Cl.**
H01L 33/62 (2010.01)
H01L 23/495 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H01L 33/62*** (2013.01); ***H01L 21/4821*** (2013.01); ***H01L 23/49541*** (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

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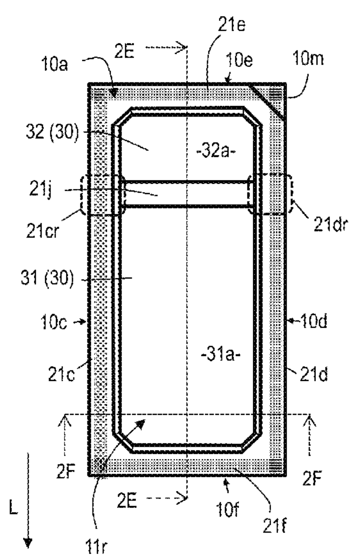
Primary Examiner — Benjamin P Sandvik
(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

A light emitting device includes: a base body including two conductive members, a resin body, and a fiber member placed inside the resin body, and a light-emitting element. The resin body includes an isolation section located between the two conductive members, and includes a pair of sandwiching portions sandwiching the isolation section. The fiber member has a length which is greater than a distance between the two conductive members, and is located at least in an adjoining region of at least one of the pair of sandwiching portions, the adjoining region adjoining the isolation section. In the adjoining region, the fiber member extends in a direction which is non-orthogonal to a direction in which that the pair of sandwiching portions extend.

36 Claims, 41 Drawing Sheets



(51) **Int. Cl.**

H01L 21/48	(2006.01)
H01L 33/48	(2010.01)
H01L 33/52	(2010.01)

(52) **U.S. Cl.**

CPC ***H01L 23/49586*** (2013.01); *H01L 33/483* (2013.01); *H01L 33/52* (2013.01); *H01L 2933/0066* (2013.01)

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FIG.1

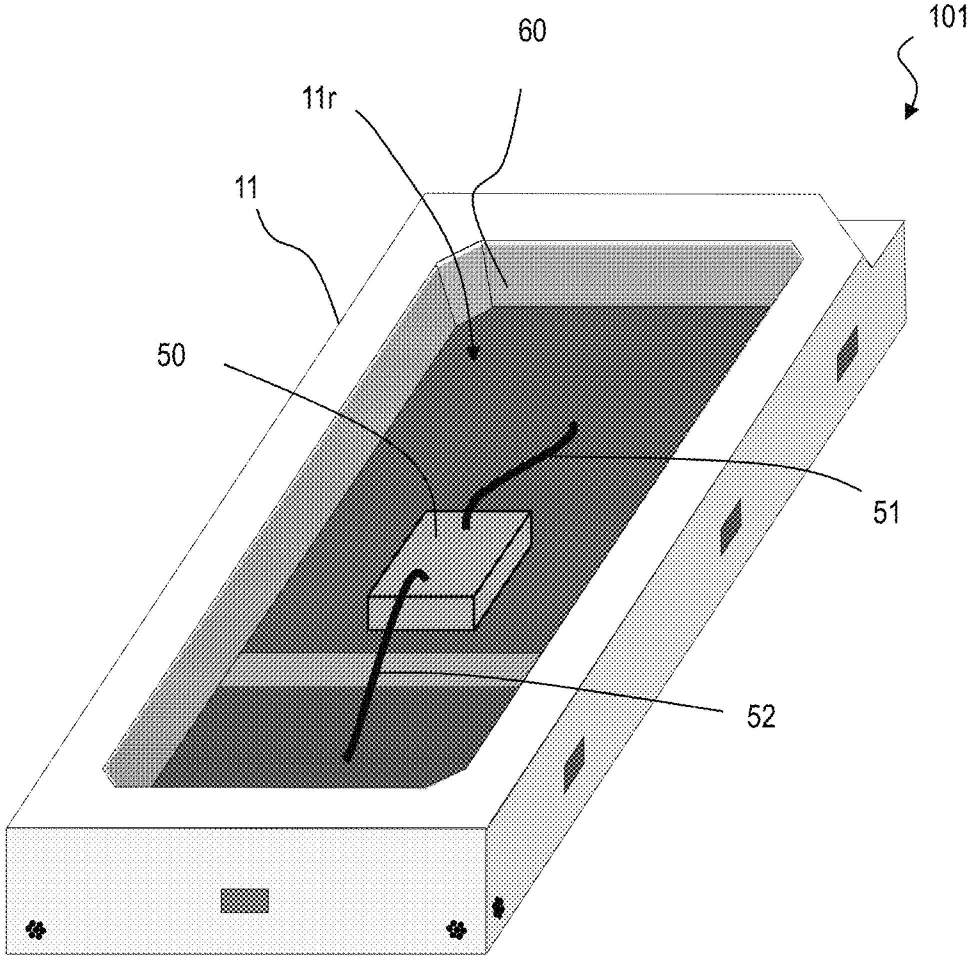
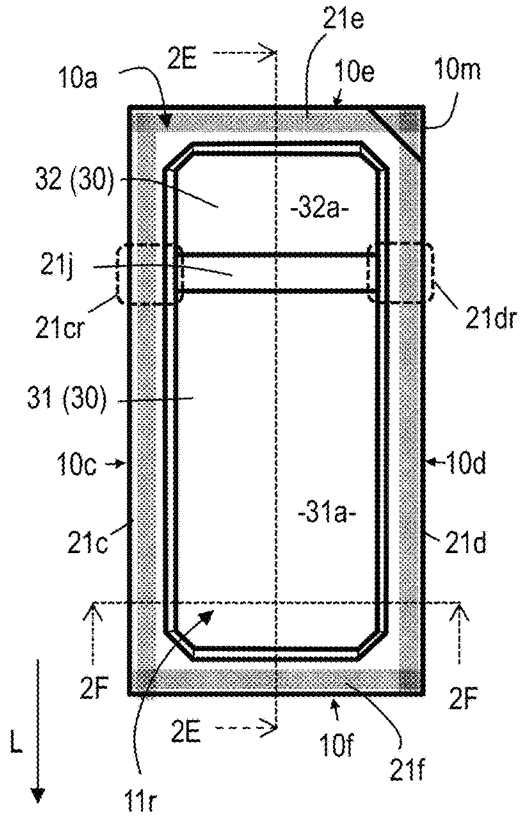


FIG.2A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21d
2F
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2E
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21f
11r

FIG.2B

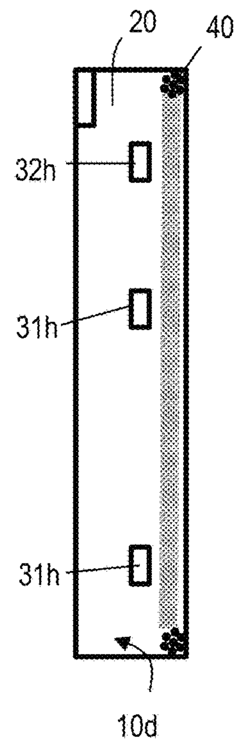
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FIG.2C

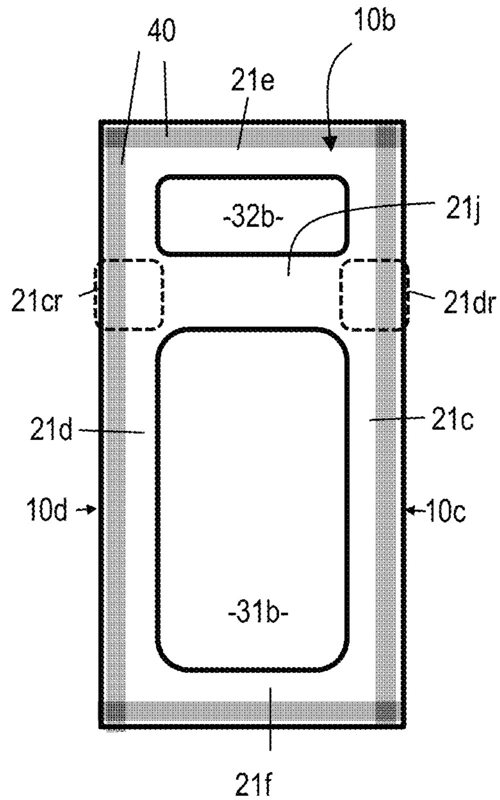


FIG.2D

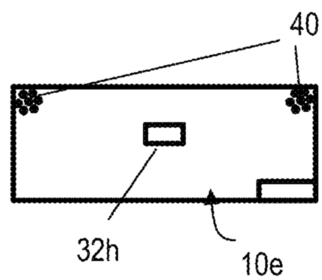


FIG.2E

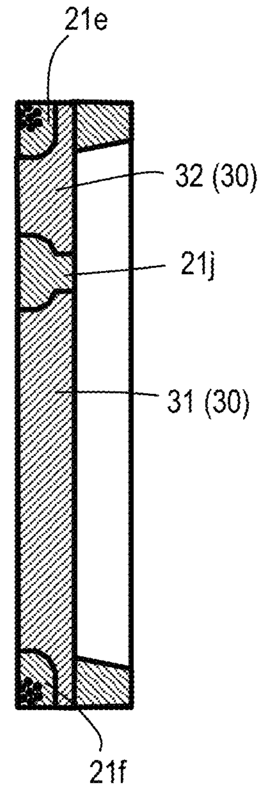


FIG.2F

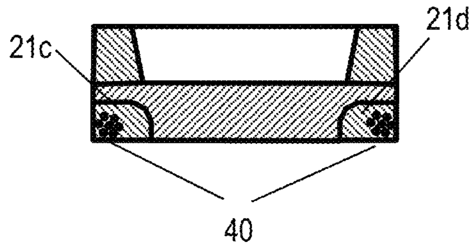
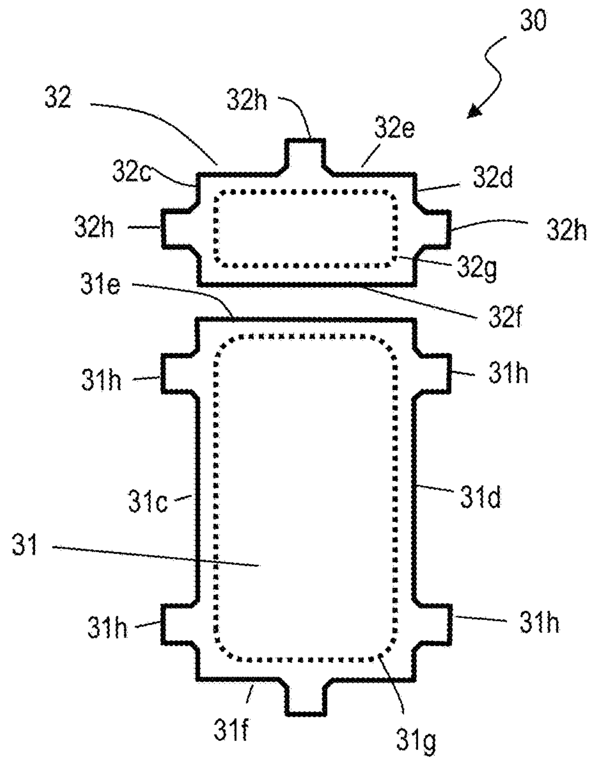


FIG.3A



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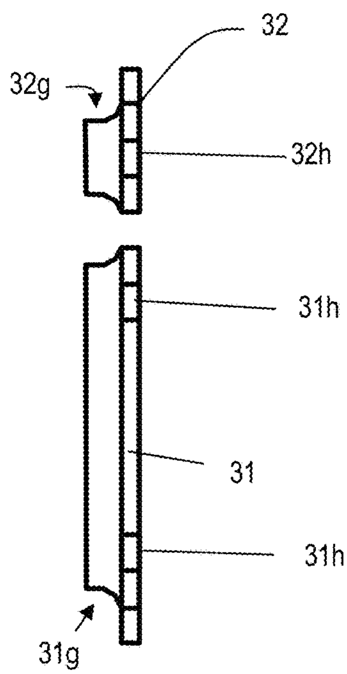

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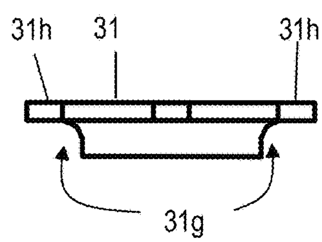
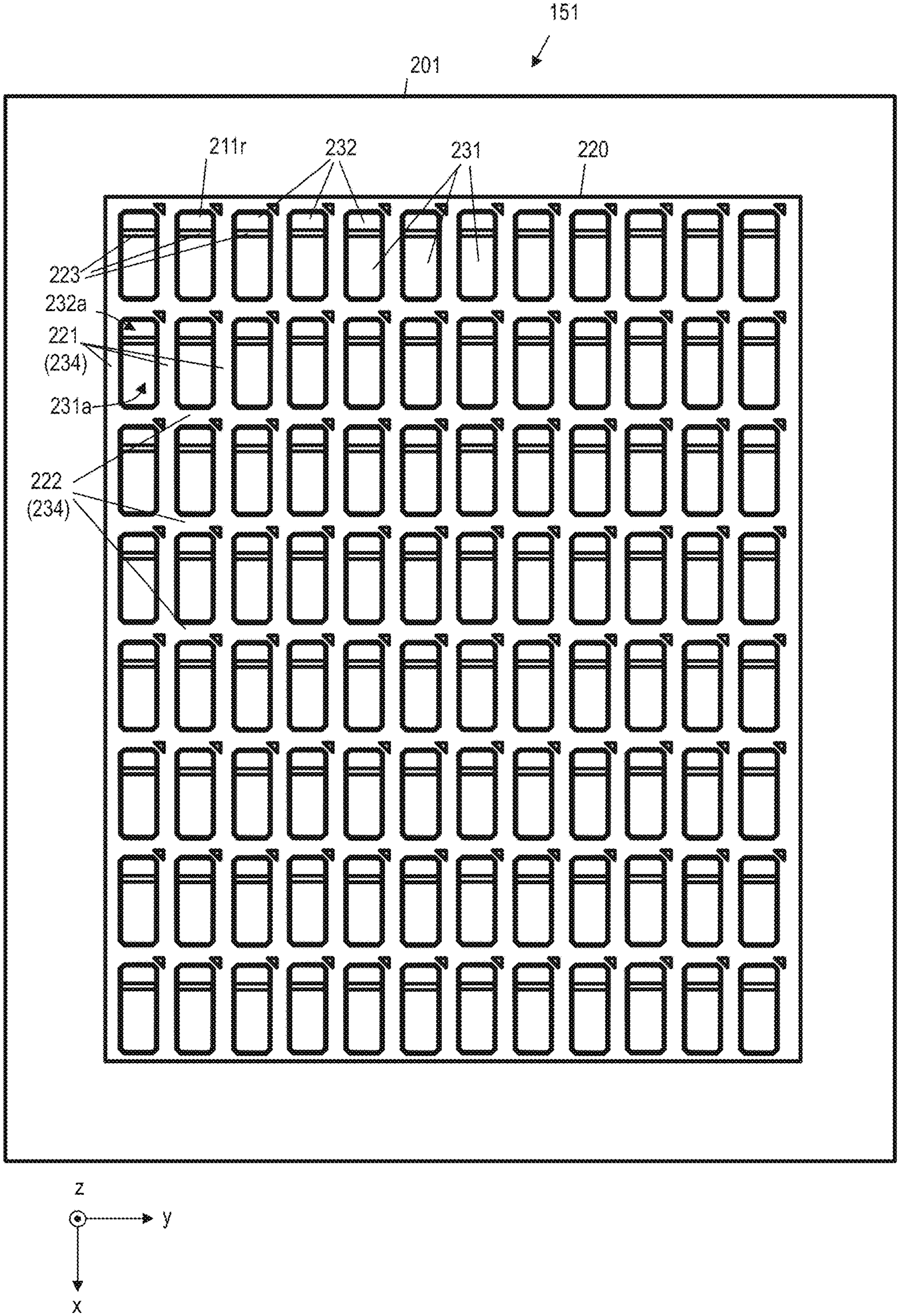


FIG. 4A



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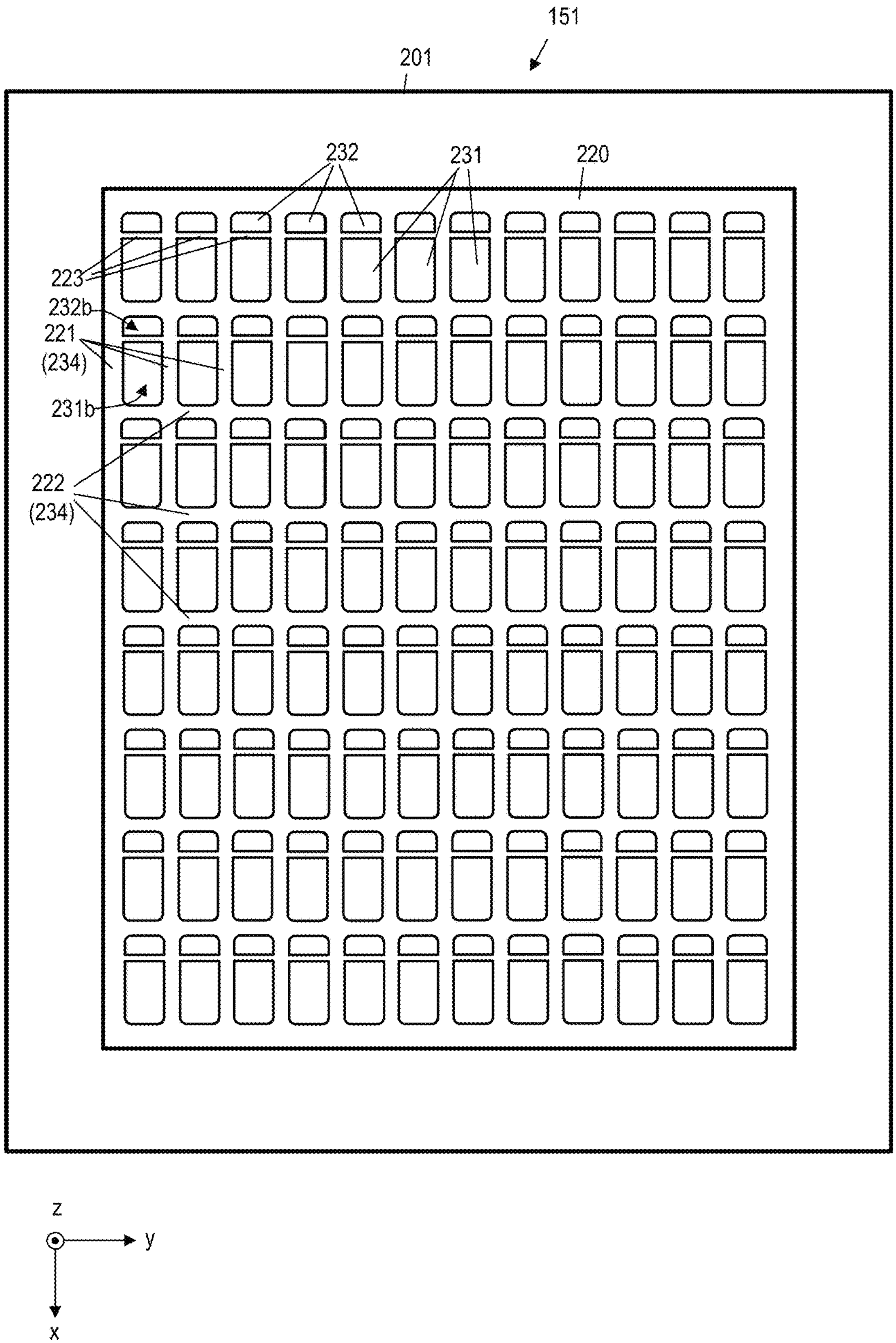
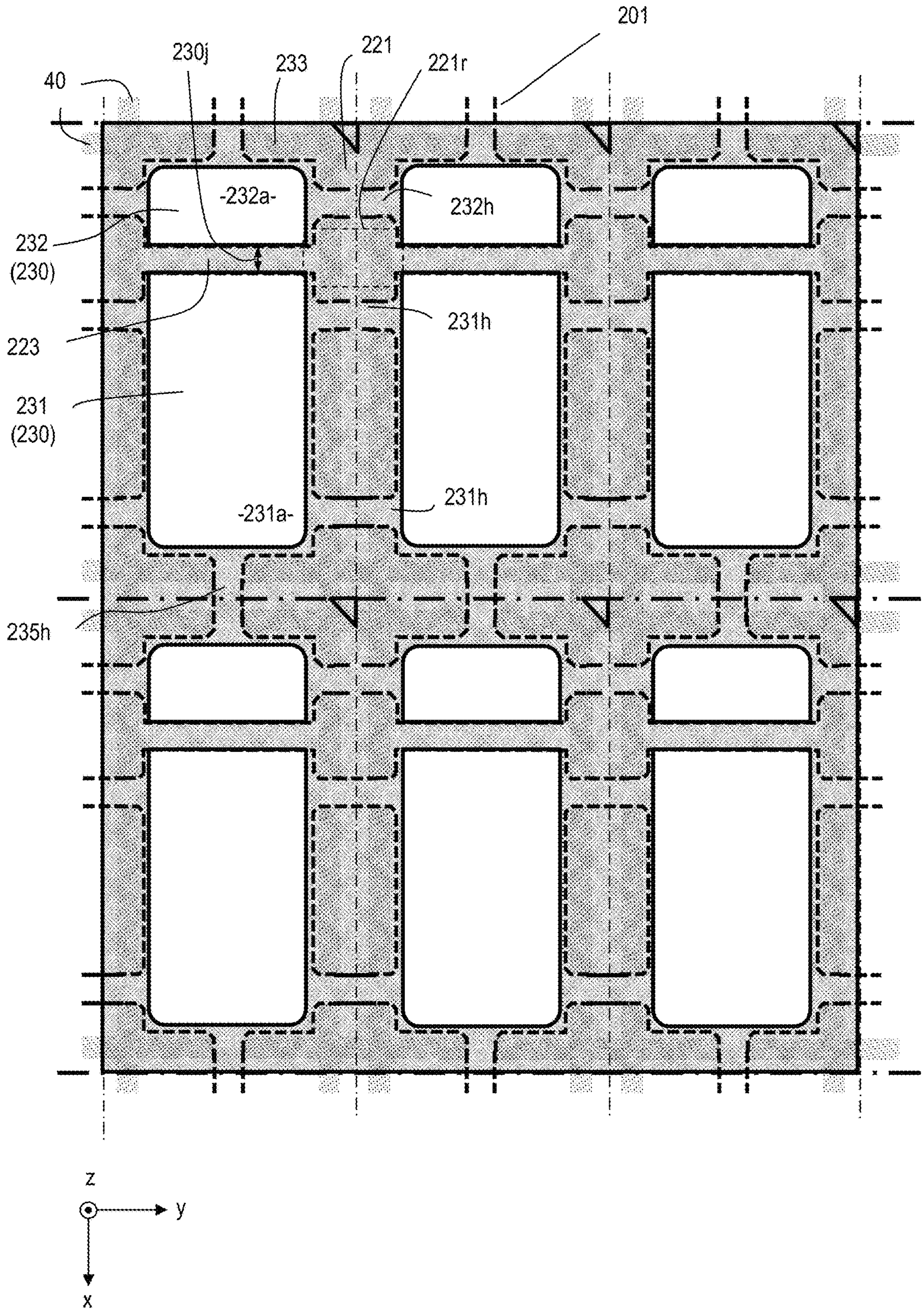


FIG.4C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(230)
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z
y
x

FIG.5A

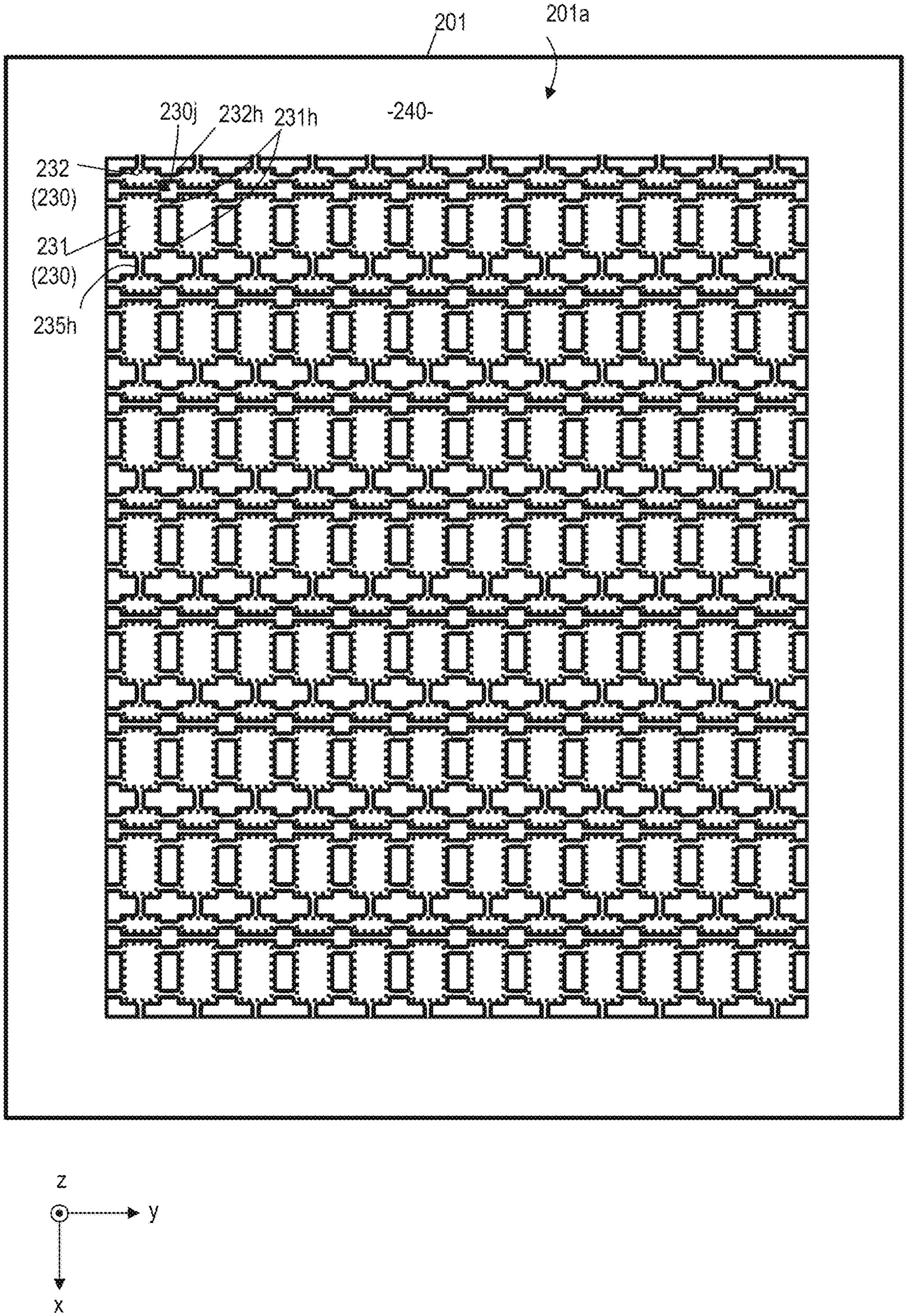

FIG.5B

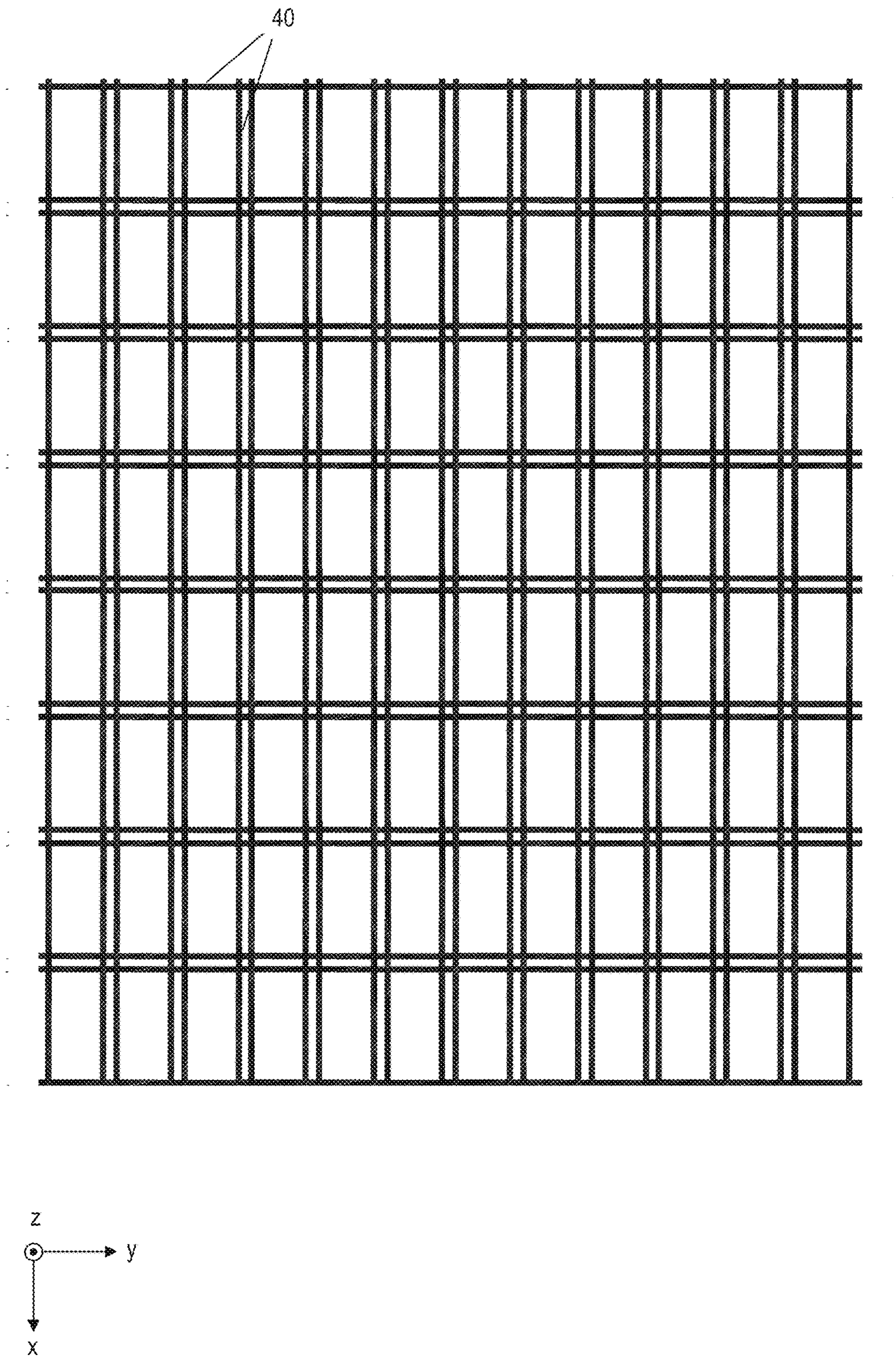

FIG.5C

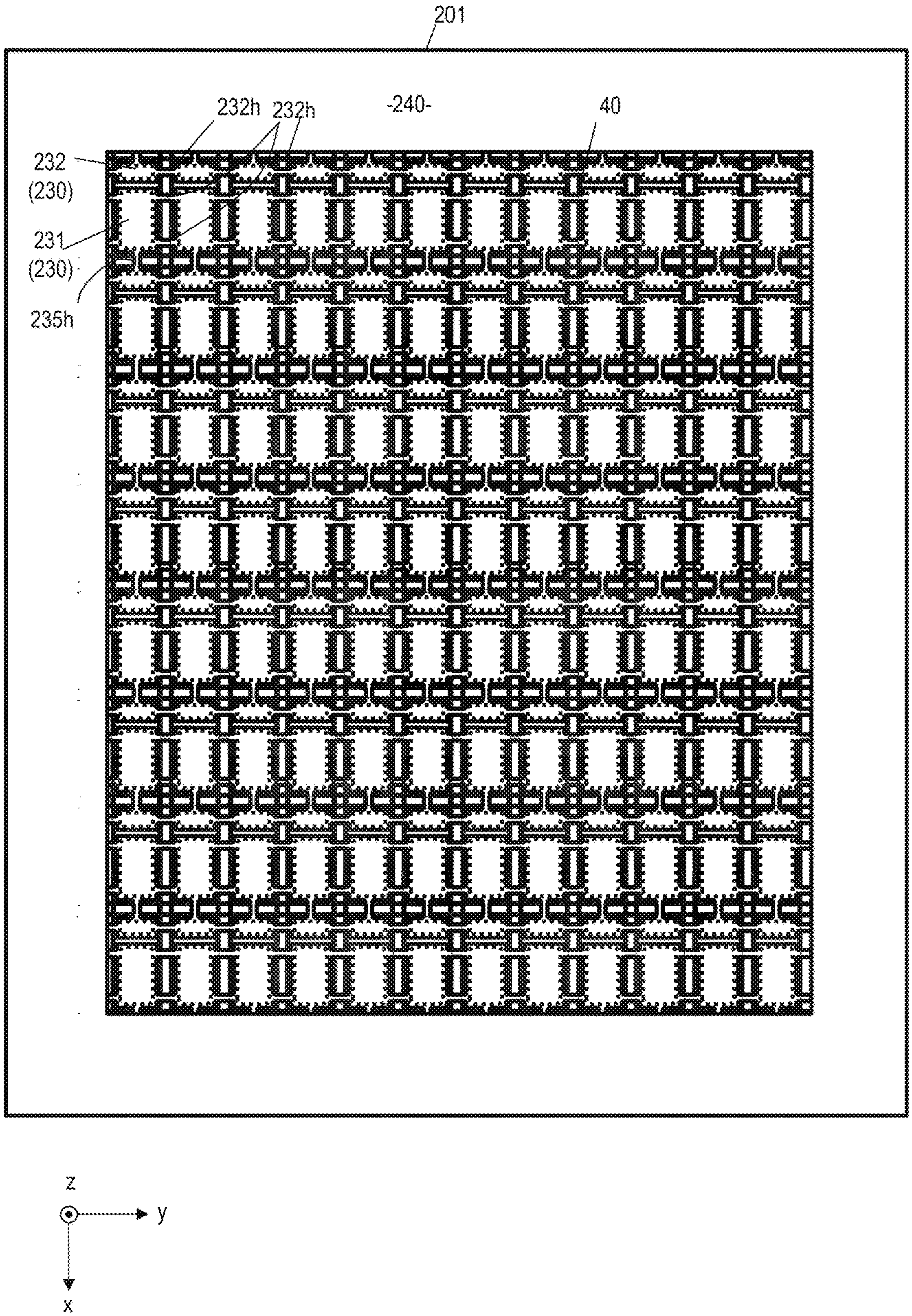

FIG. 5D

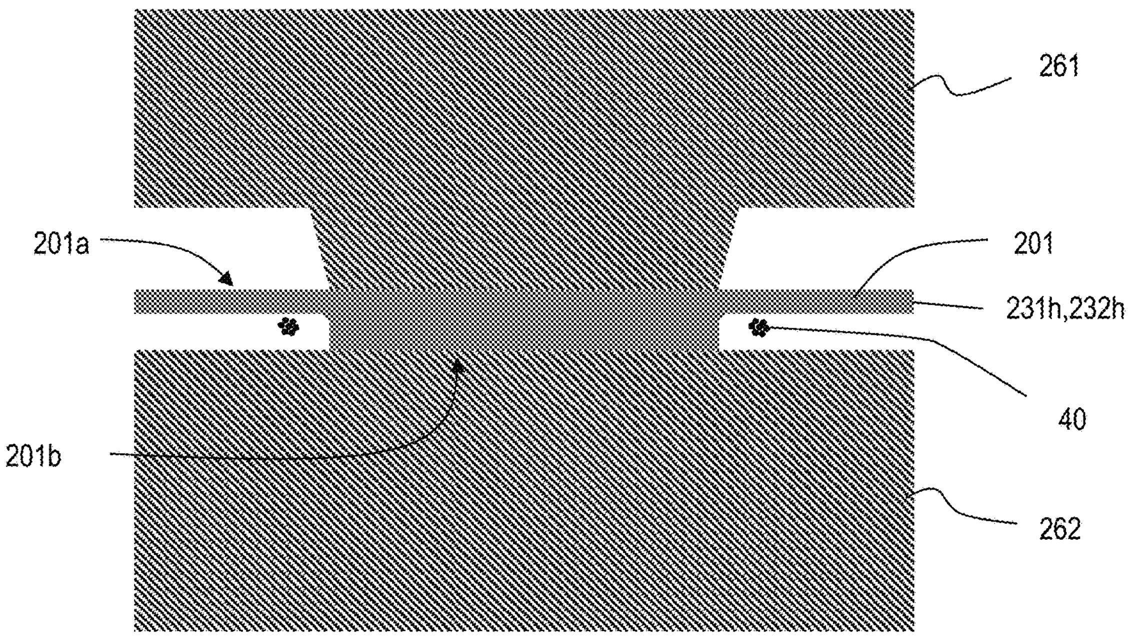

FIG. 5E

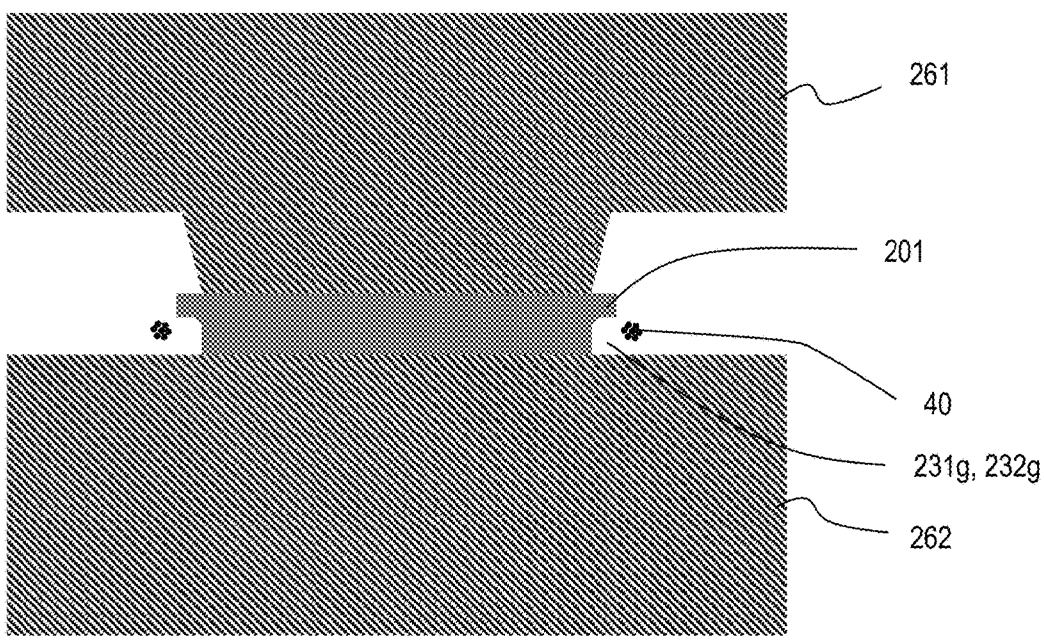

FIG.6

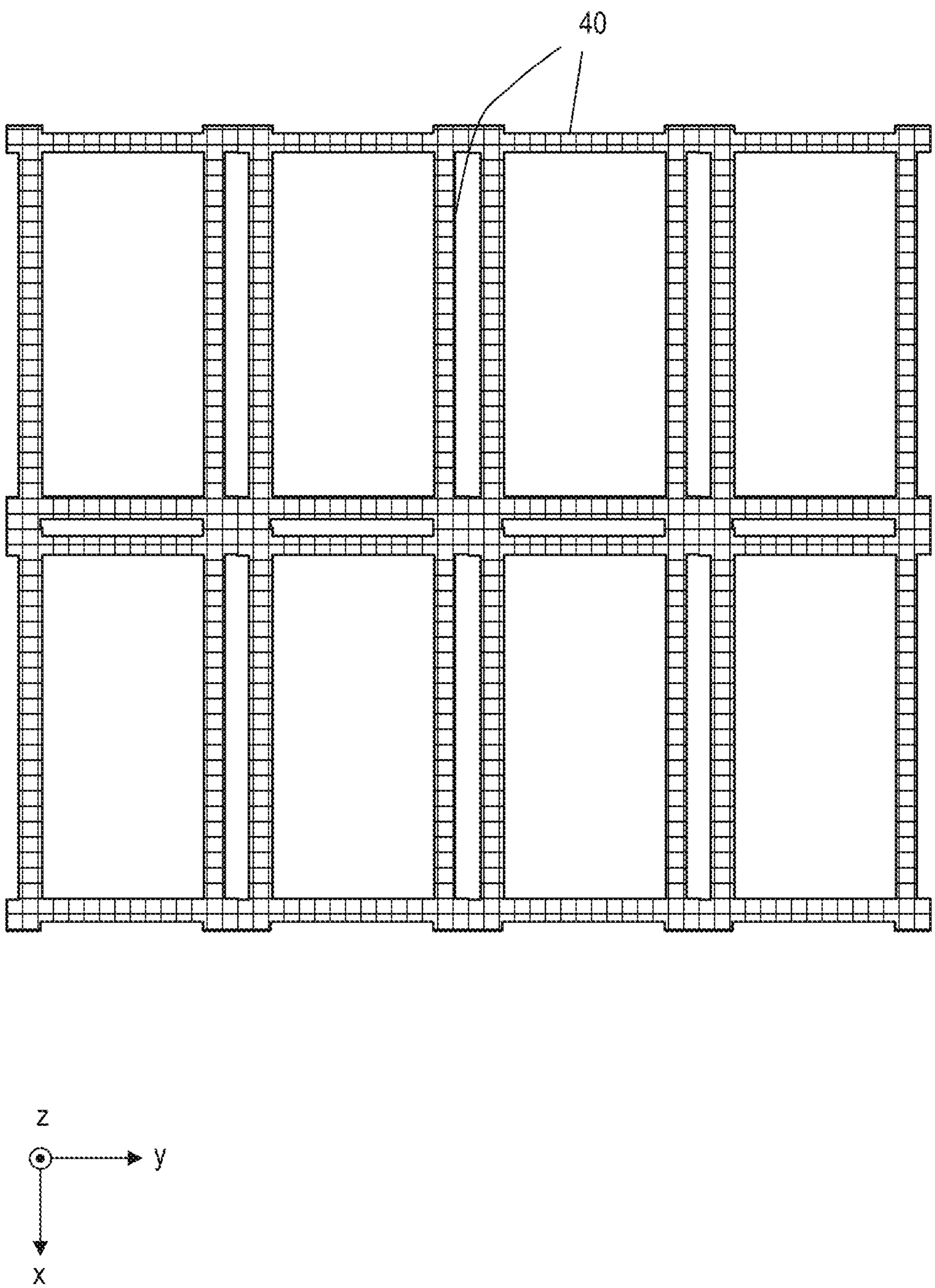

FIG. 7A

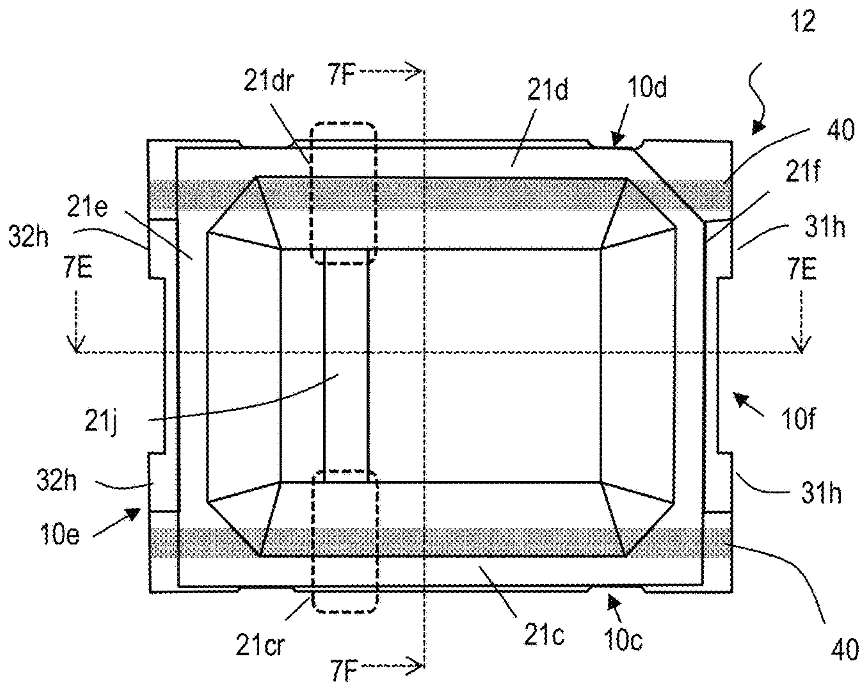
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FIG. 7B

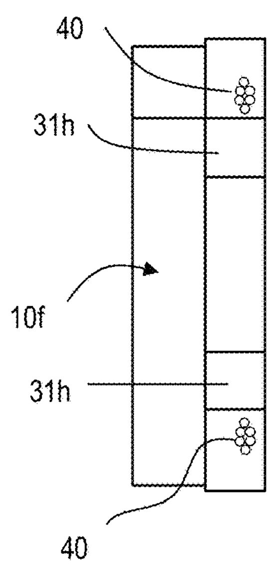
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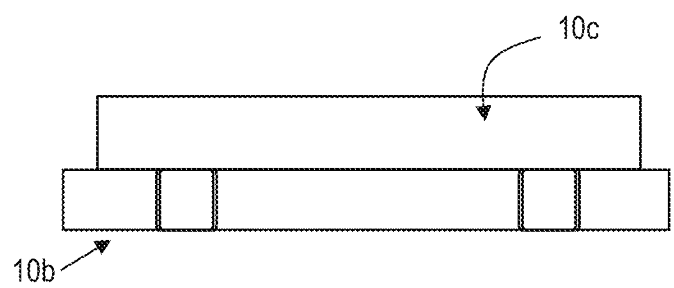
FIG. 7C



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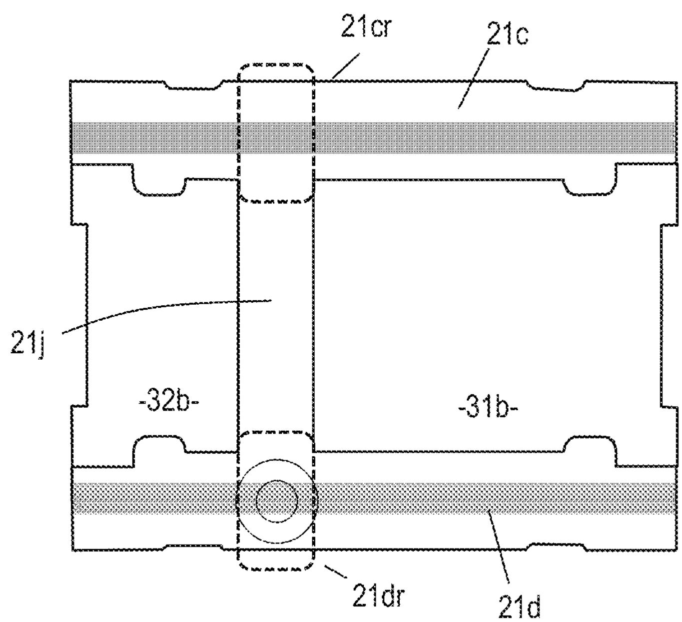

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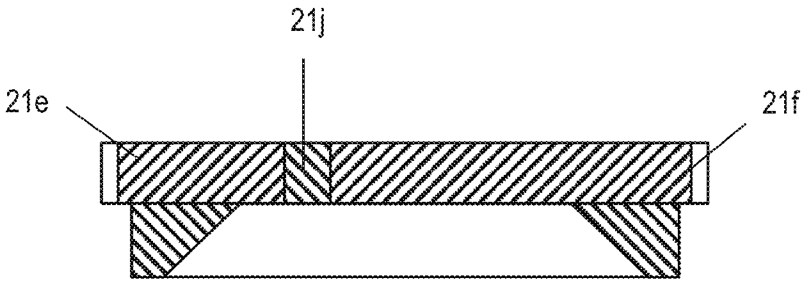

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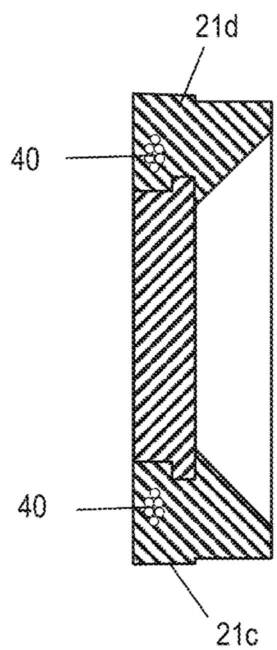
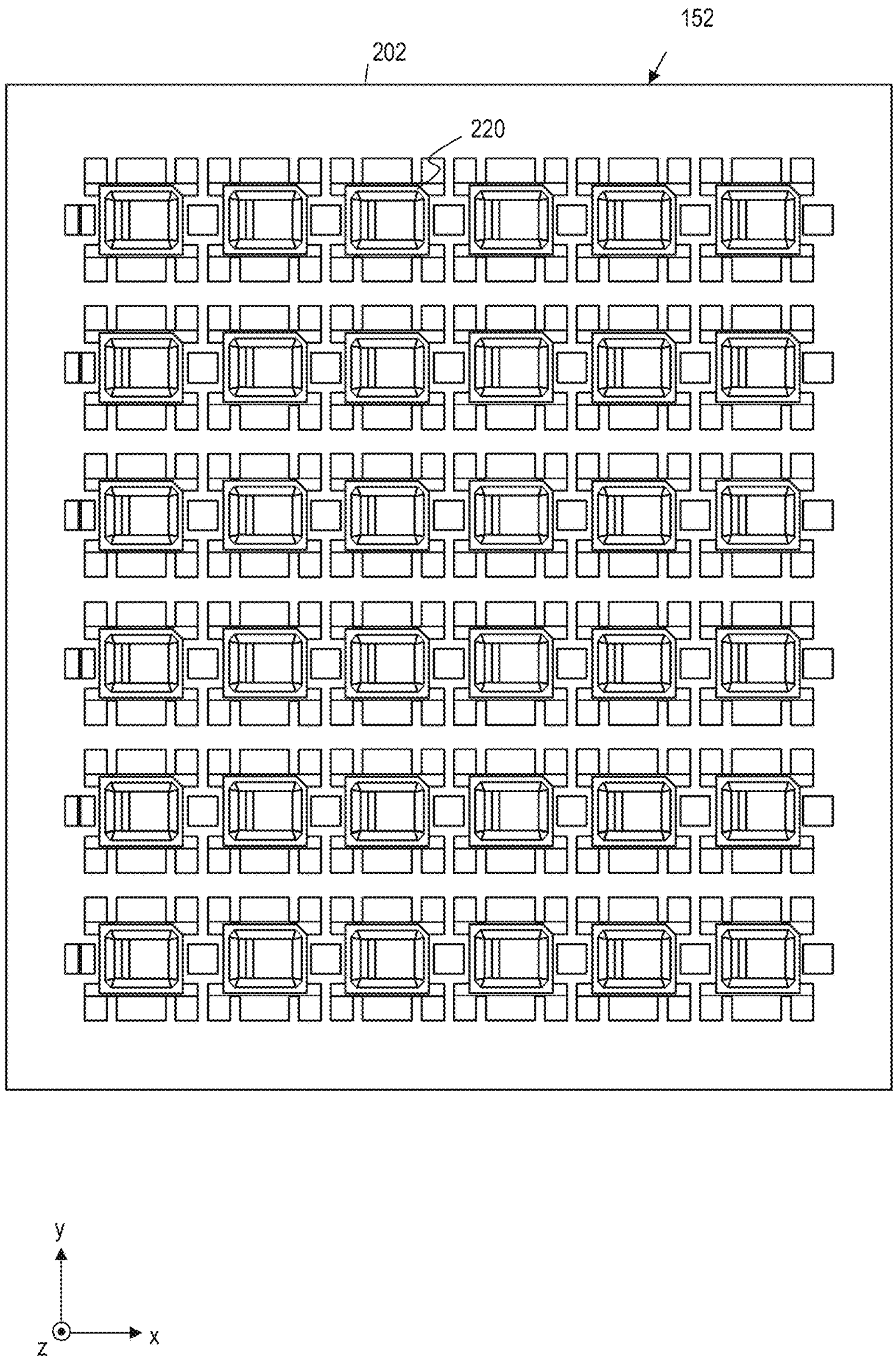


FIG.8A



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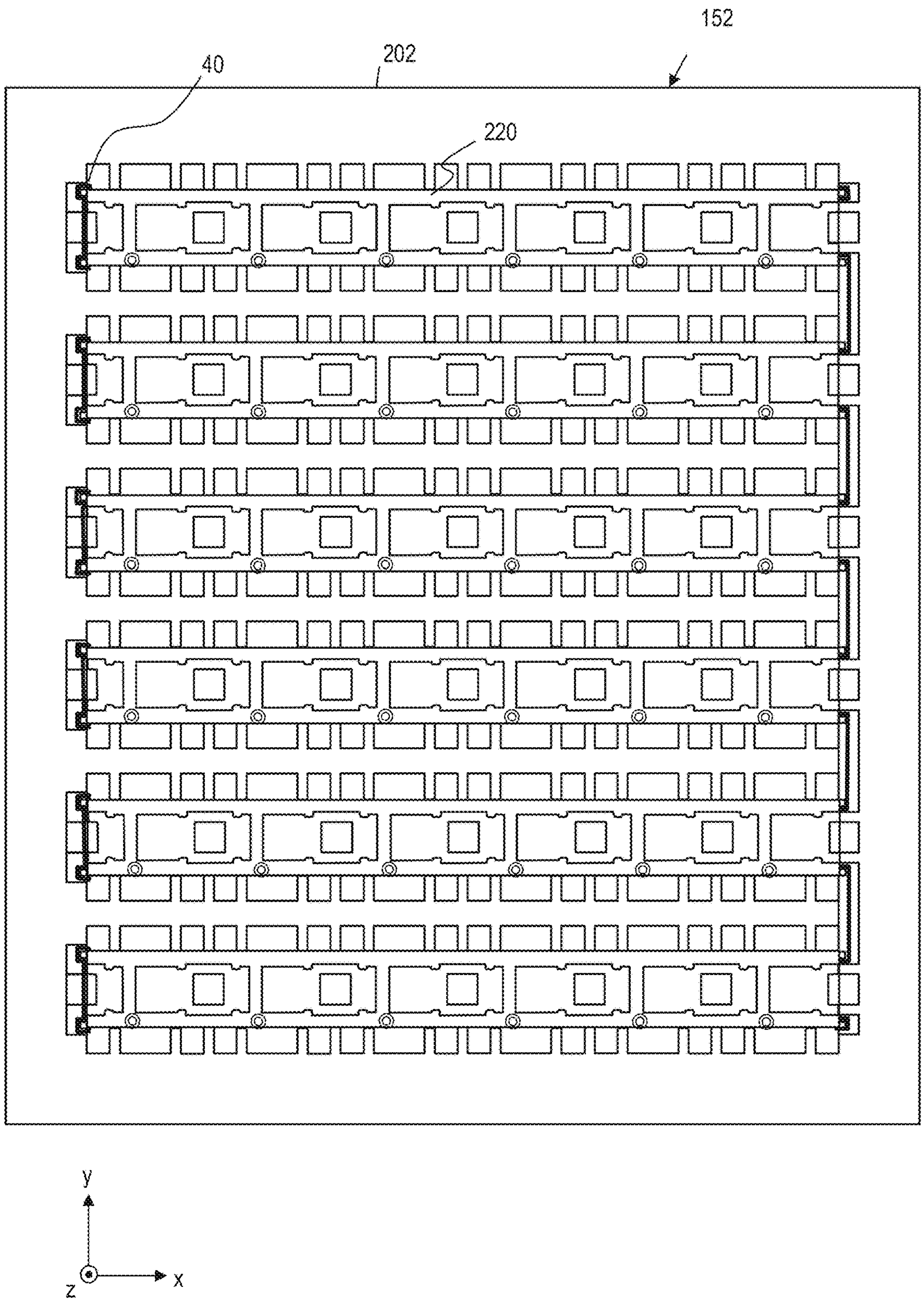


FIG.9A

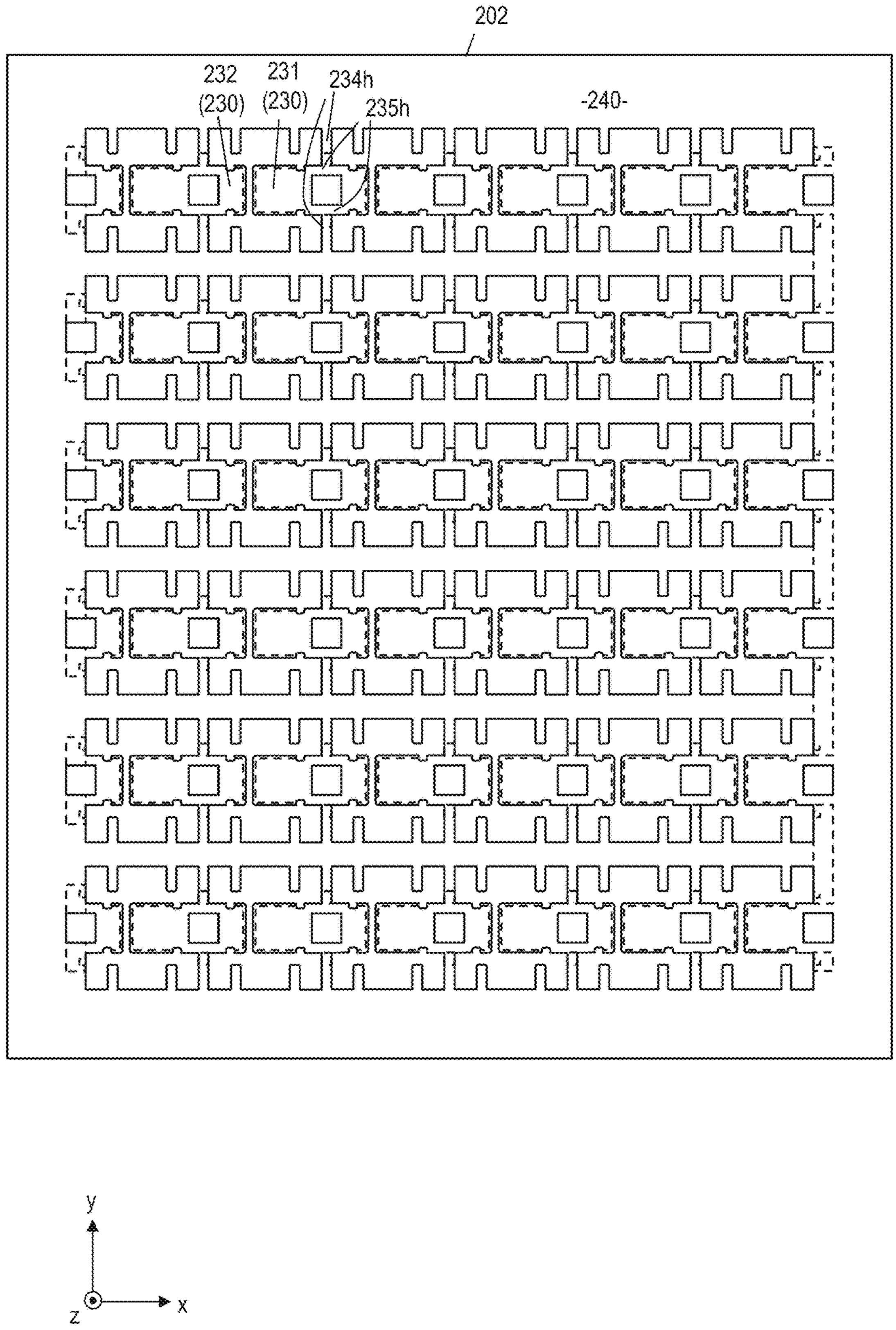


FIG.9B

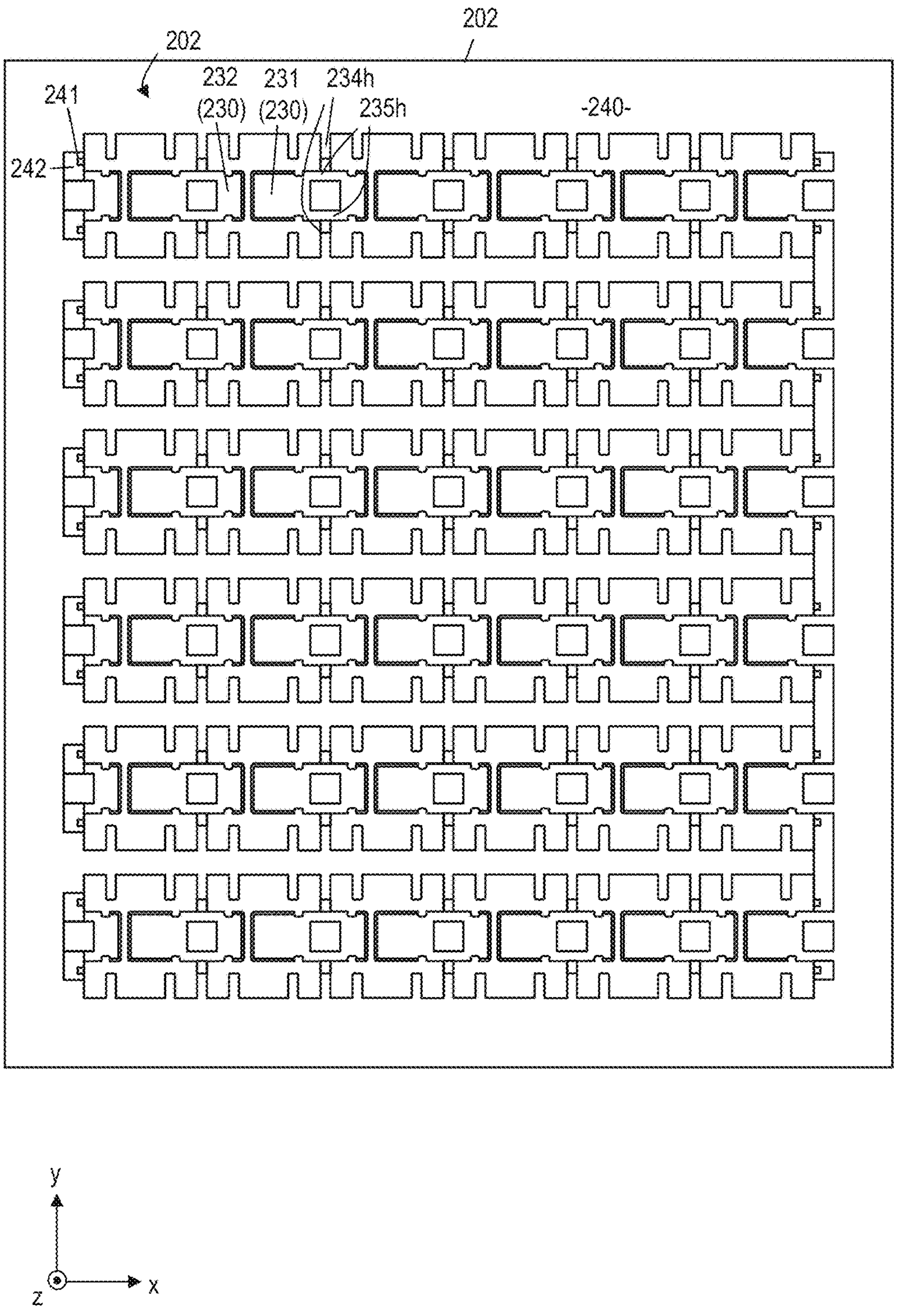


FIG.9C

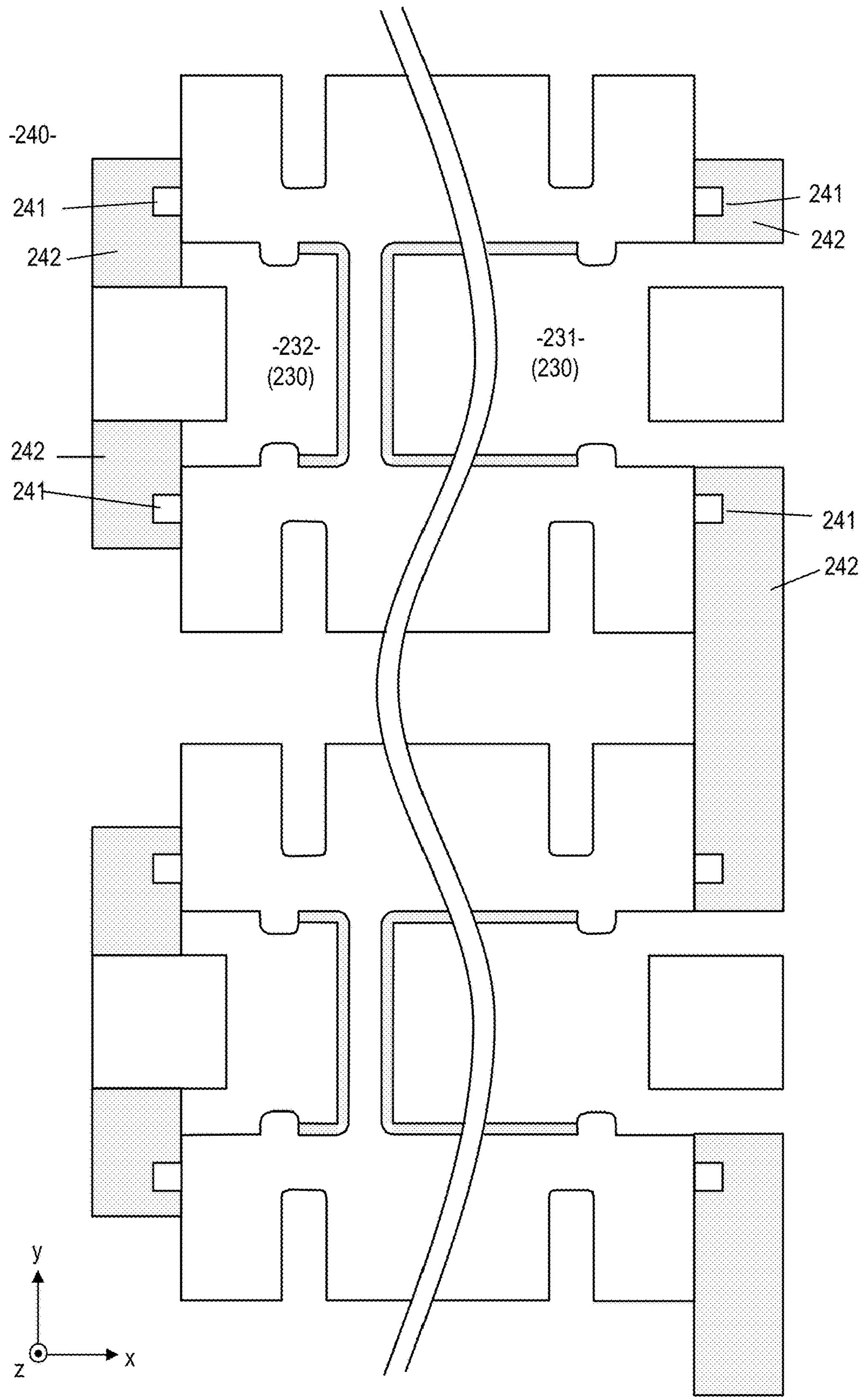


FIG. 10

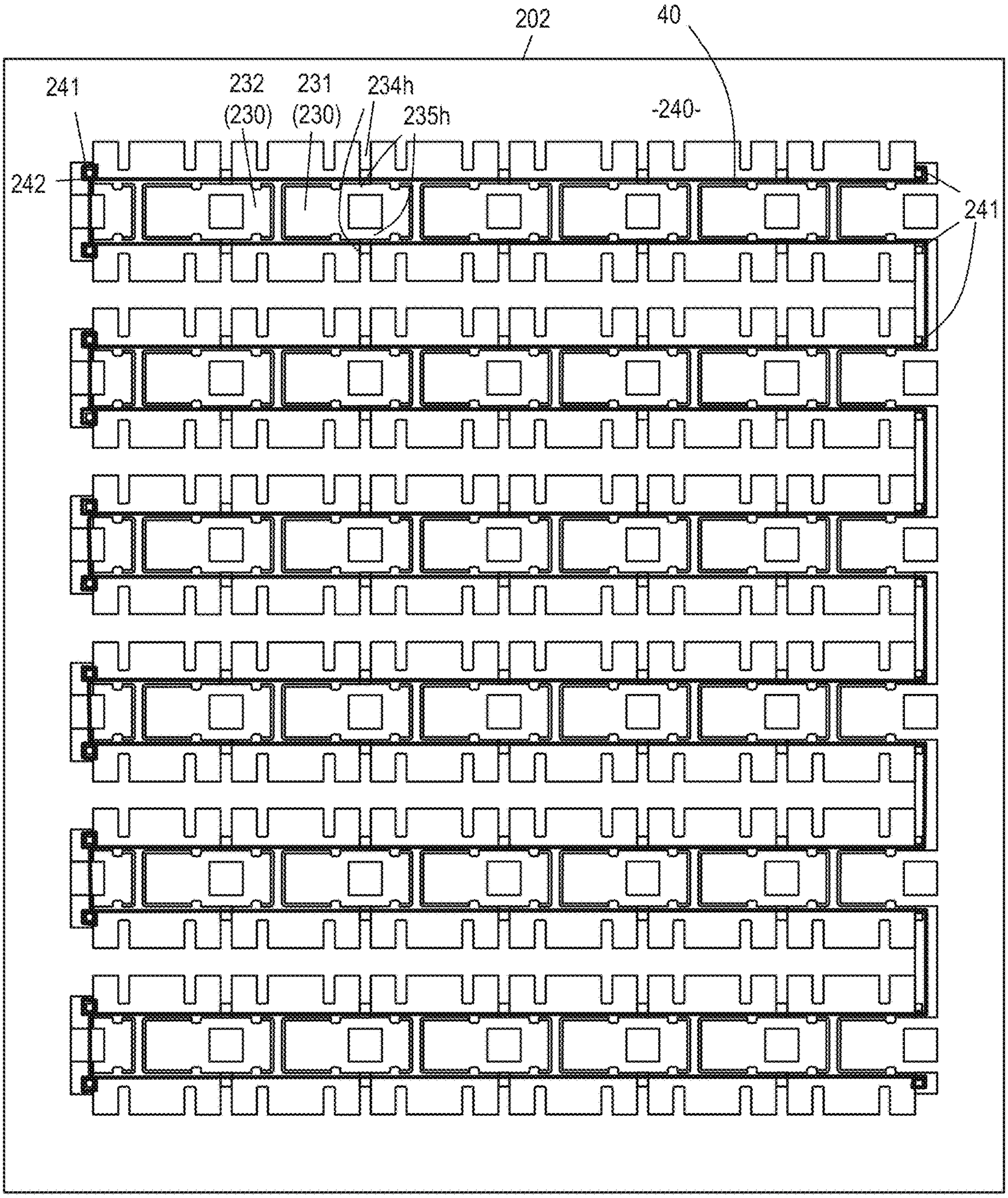
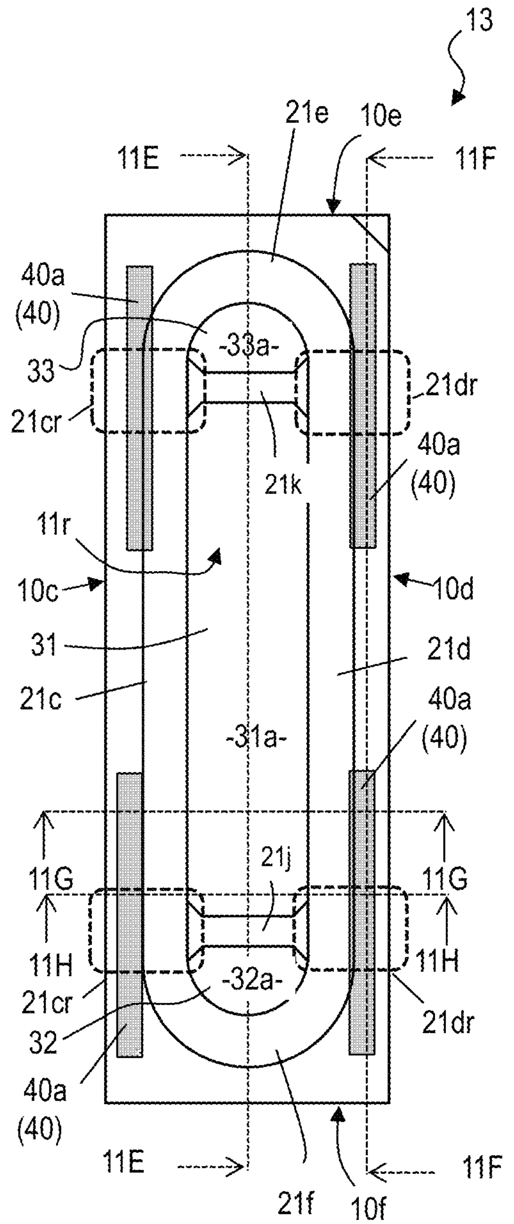


FIG. 11A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40a
(40)
11r
10c
10d
31
21d
21c
40a
(40)
-31a-
21j
11G
11G
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(40)
11E
11F
21f
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FIG. 11B

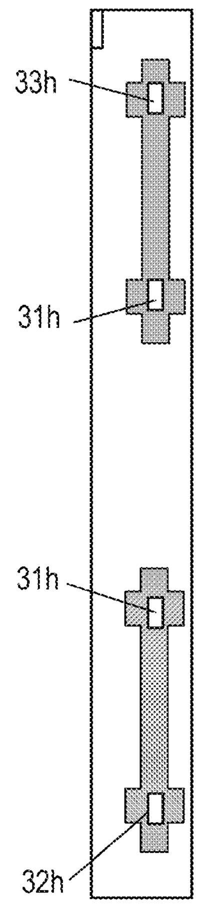


FIG. 11C

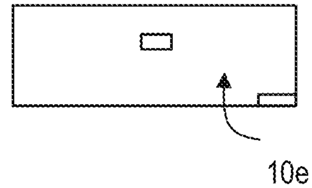
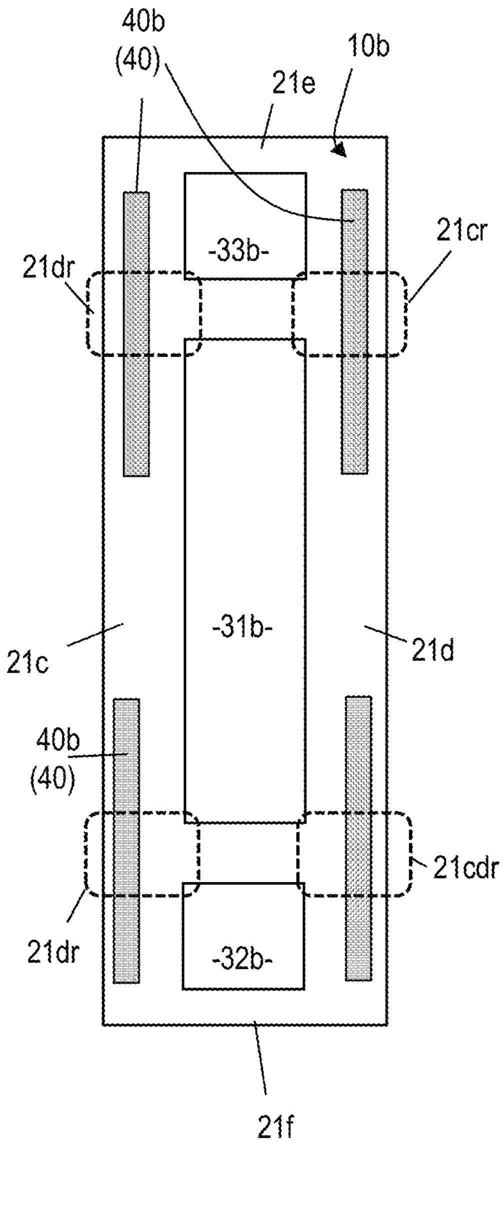


FIG.11D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(40)
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21dr
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21f

FIG. 11E

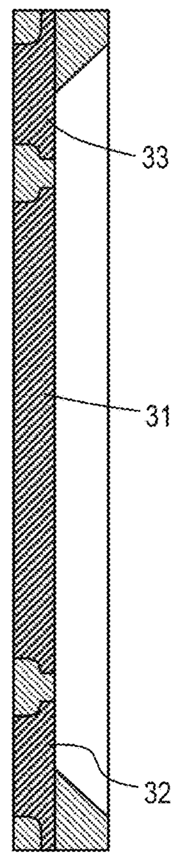


FIG. 11F

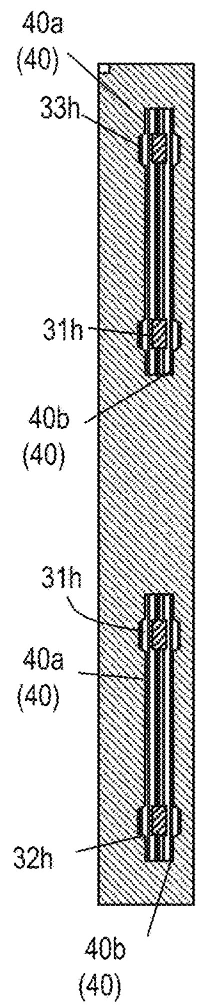


FIG. 11G

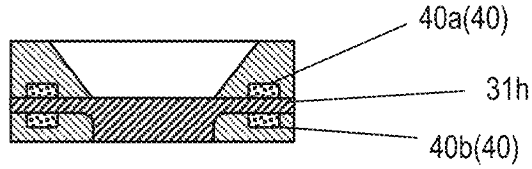
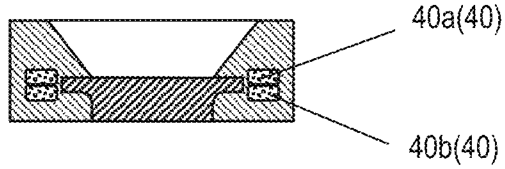


FIG. 11H



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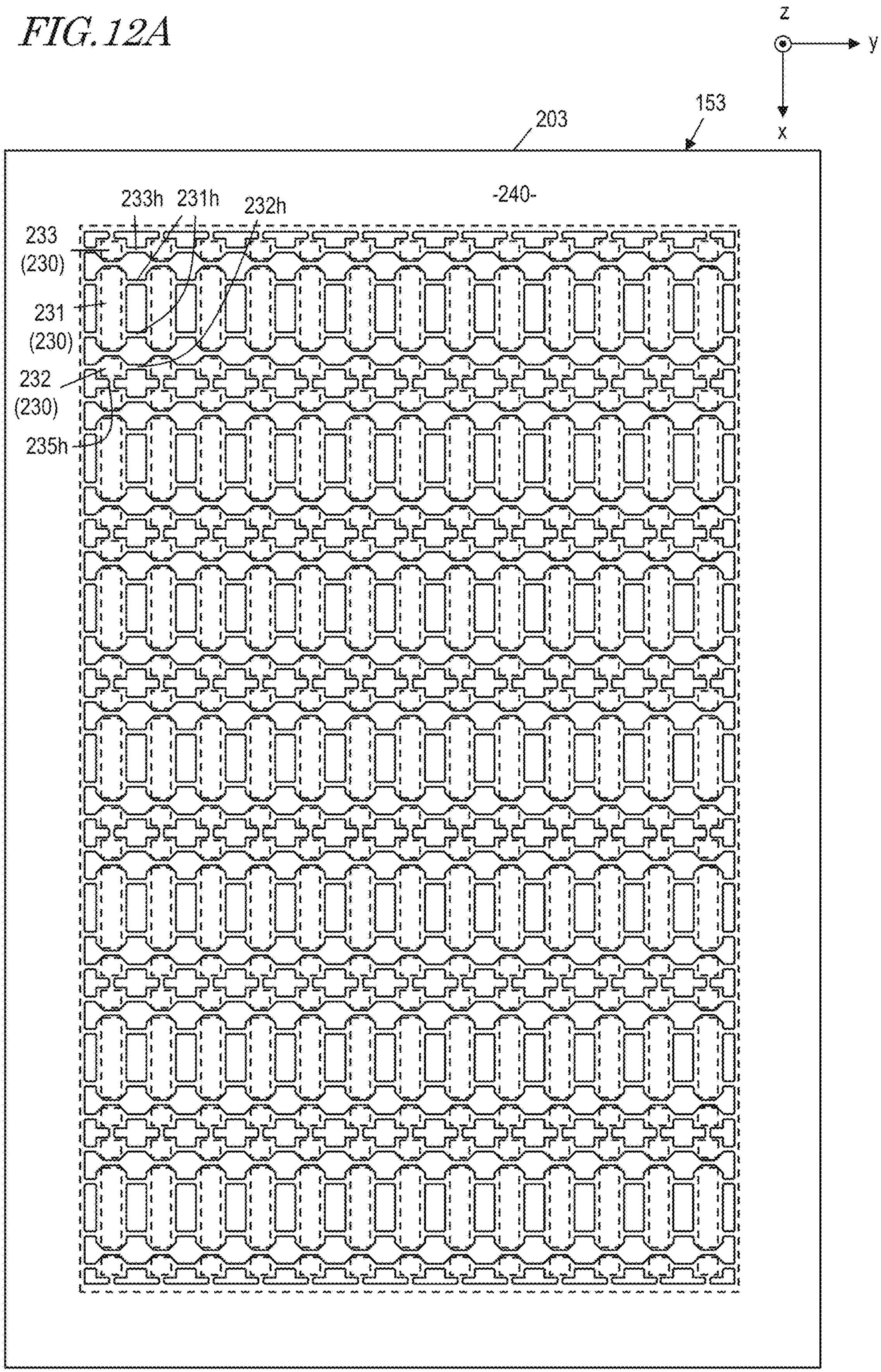


FIG.12B

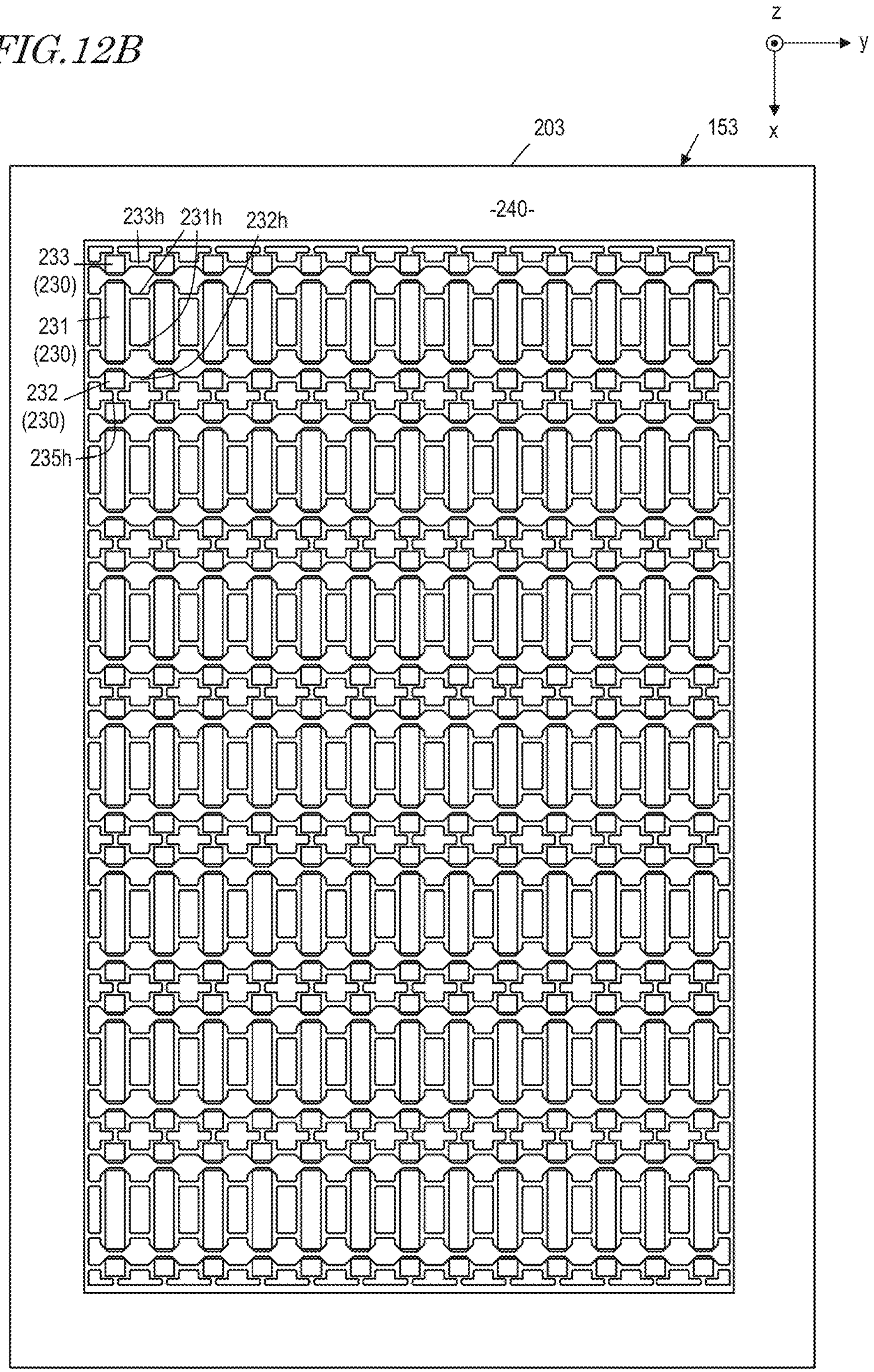


FIG. 13A

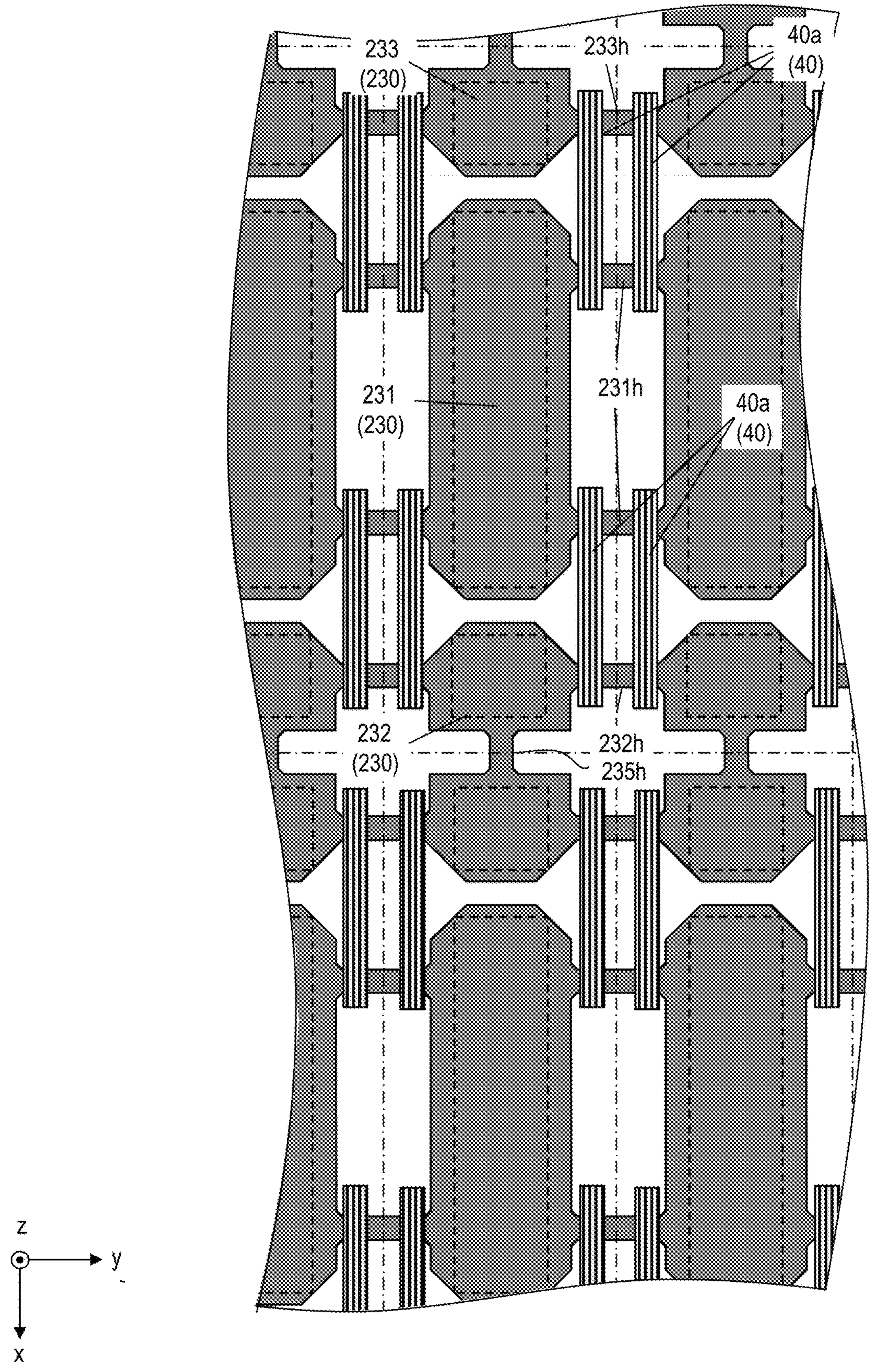


FIG.13B

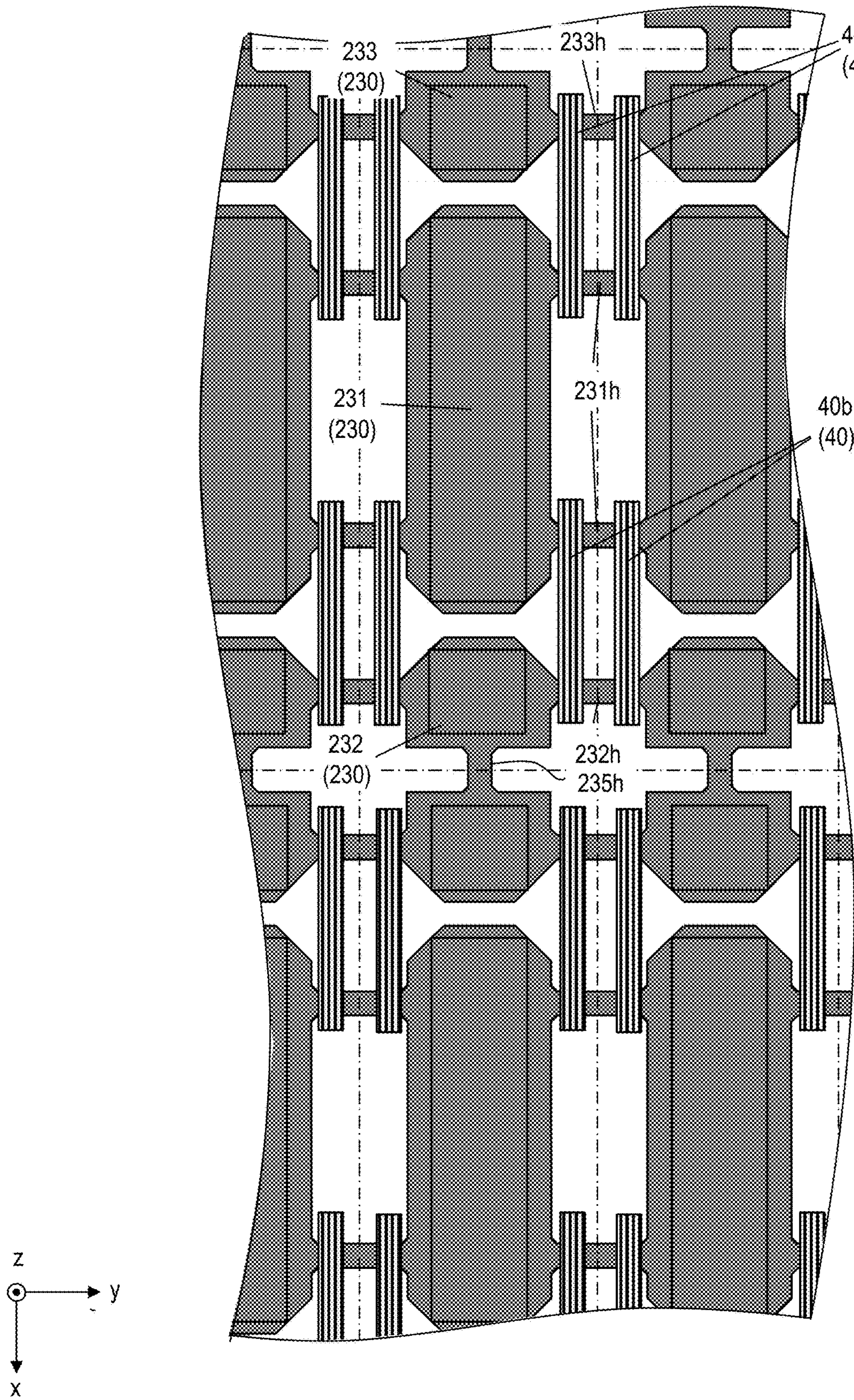


FIG.14A

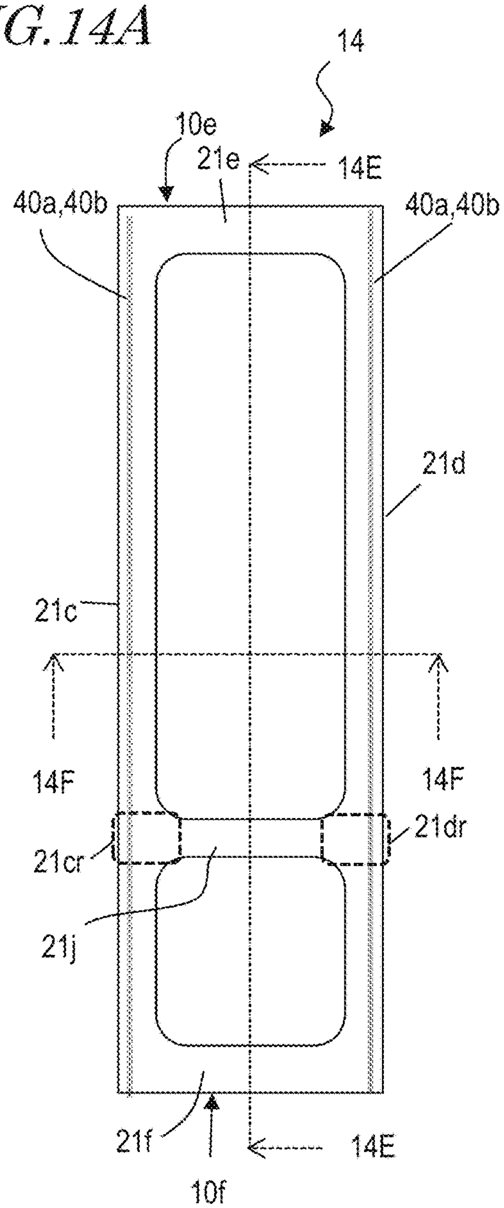


FIG.14B

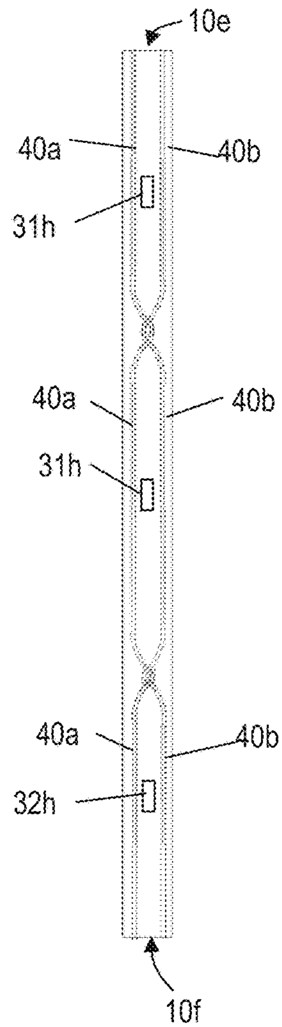


FIG. 14C

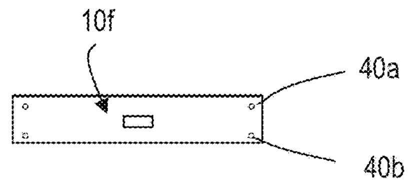


FIG. 14D

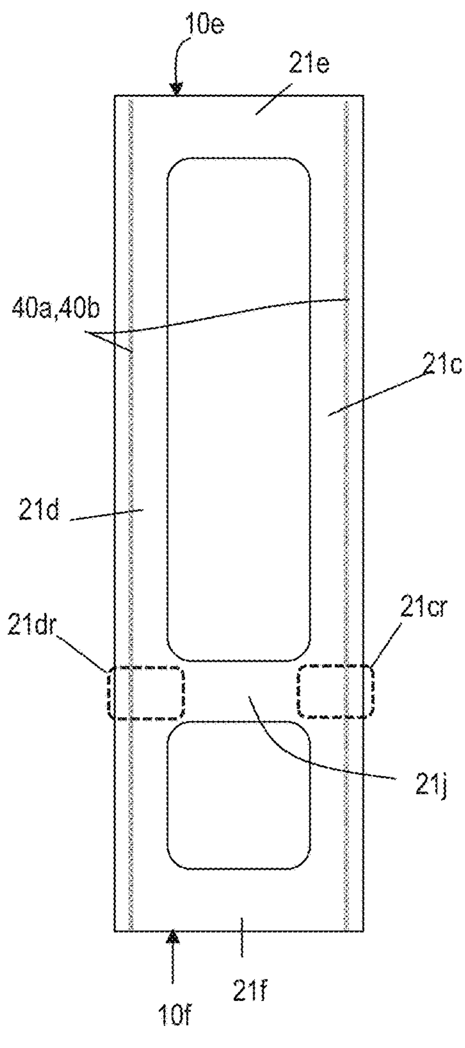


FIG. 14E

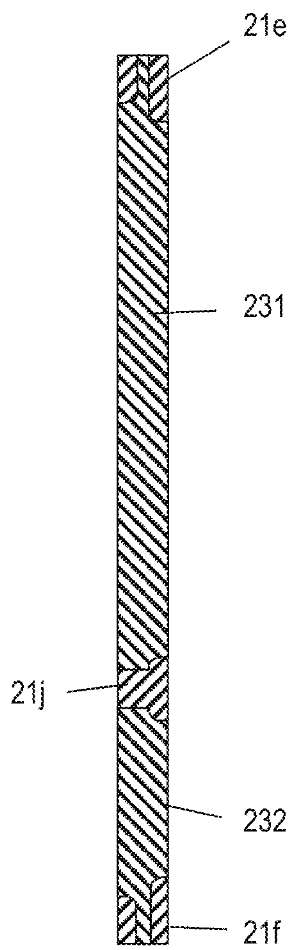


FIG. 14F

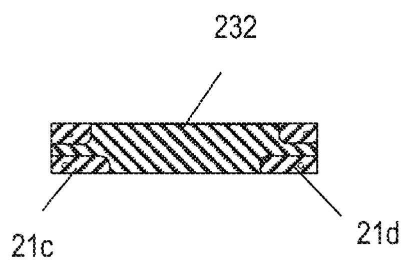


FIG.15A

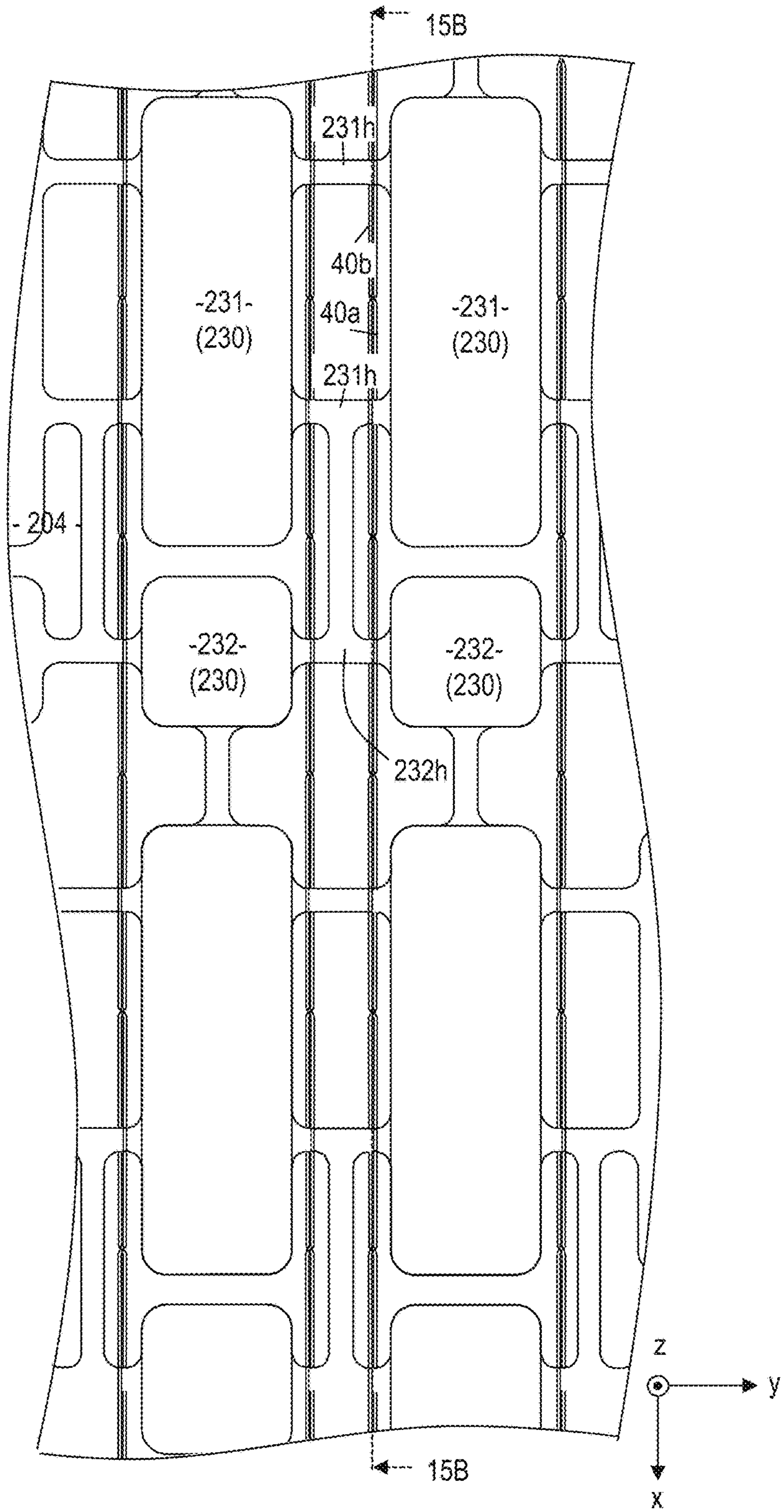


FIG.15B

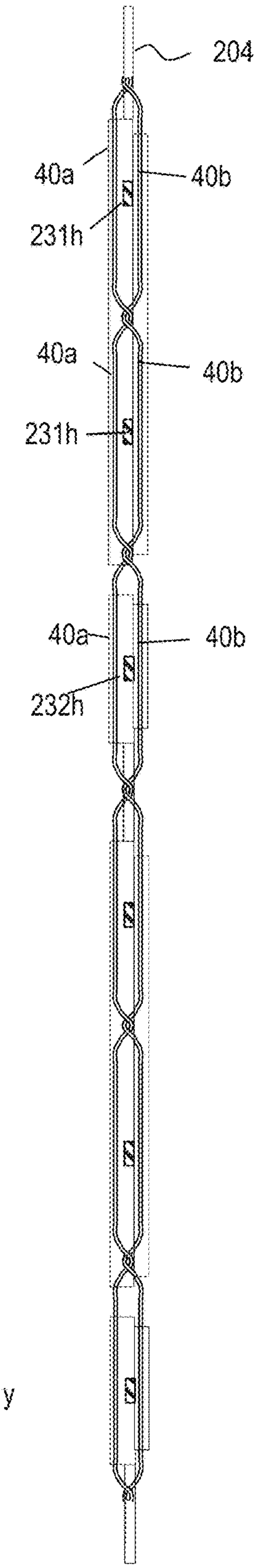


FIG. 16A

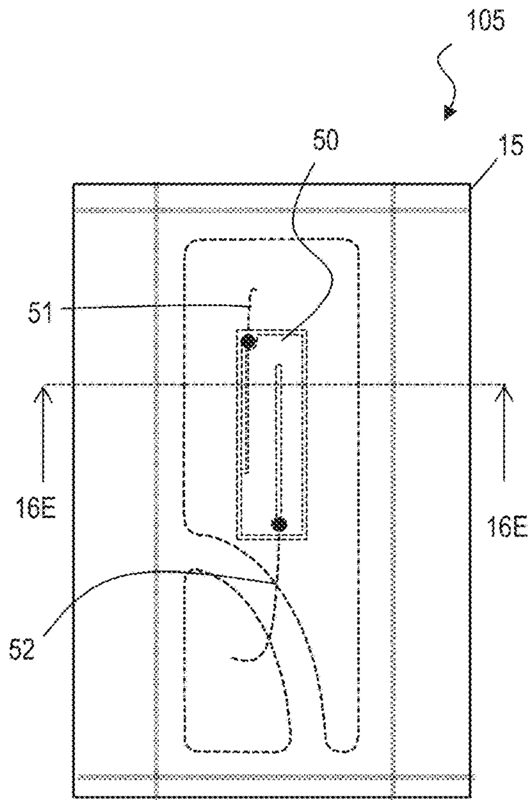


FIG. 16B

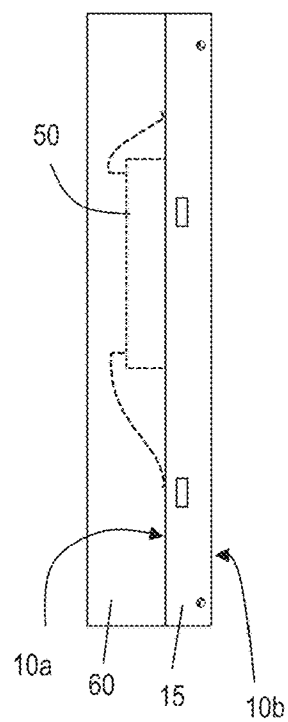


FIG.16C

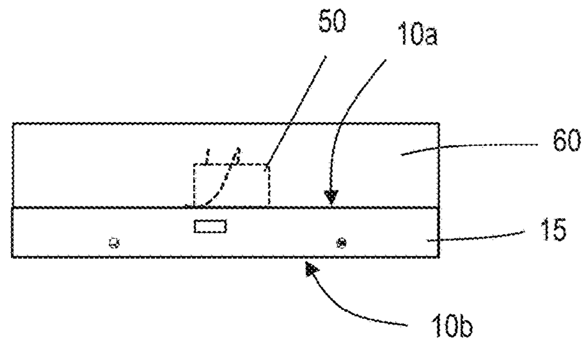


FIG.16D

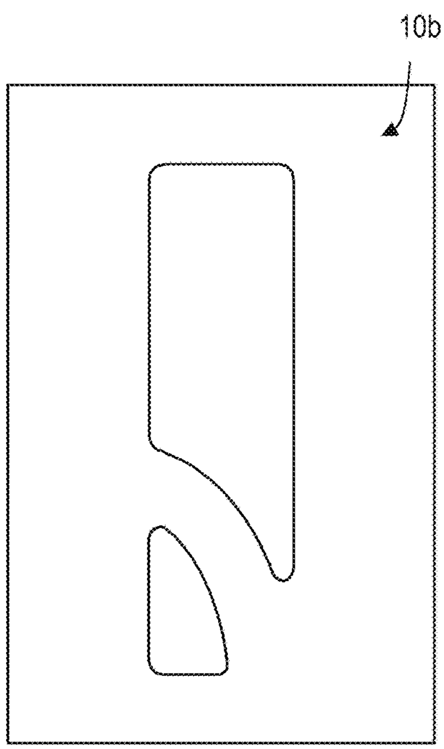


FIG.16E

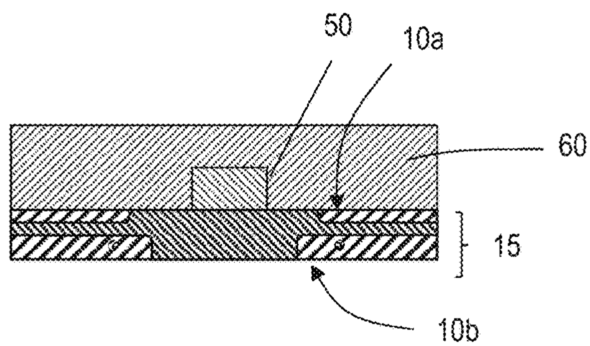


FIG.17A

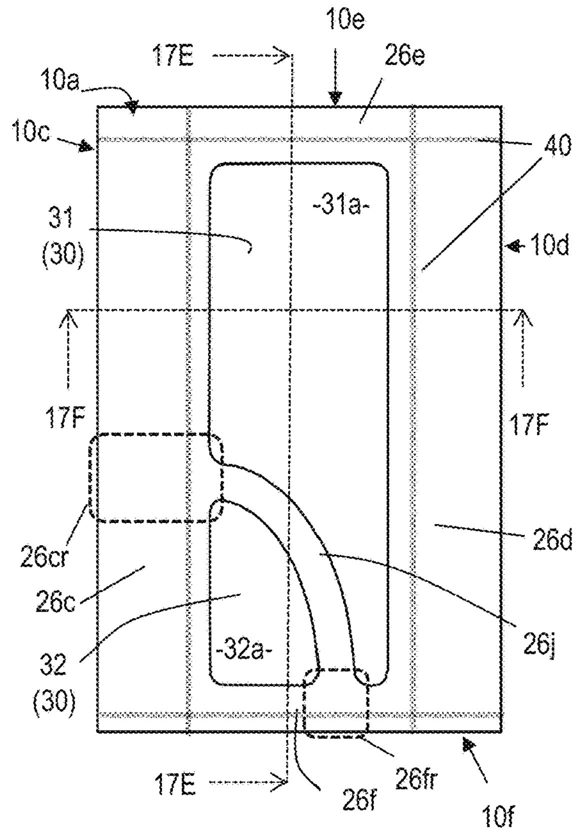


FIG.17B

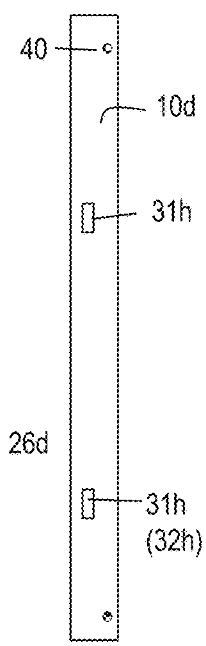


FIG. 17C

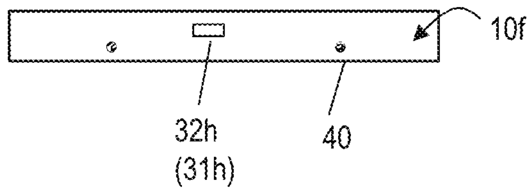


FIG. 17D

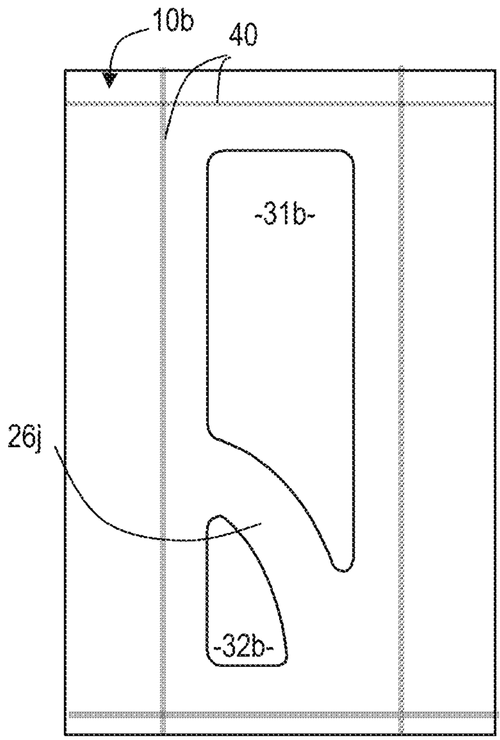


FIG. 17E

FIG. 17F

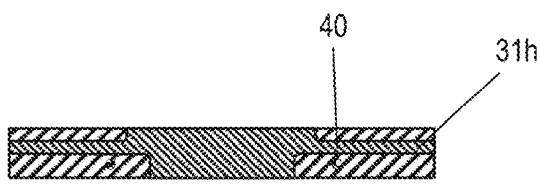
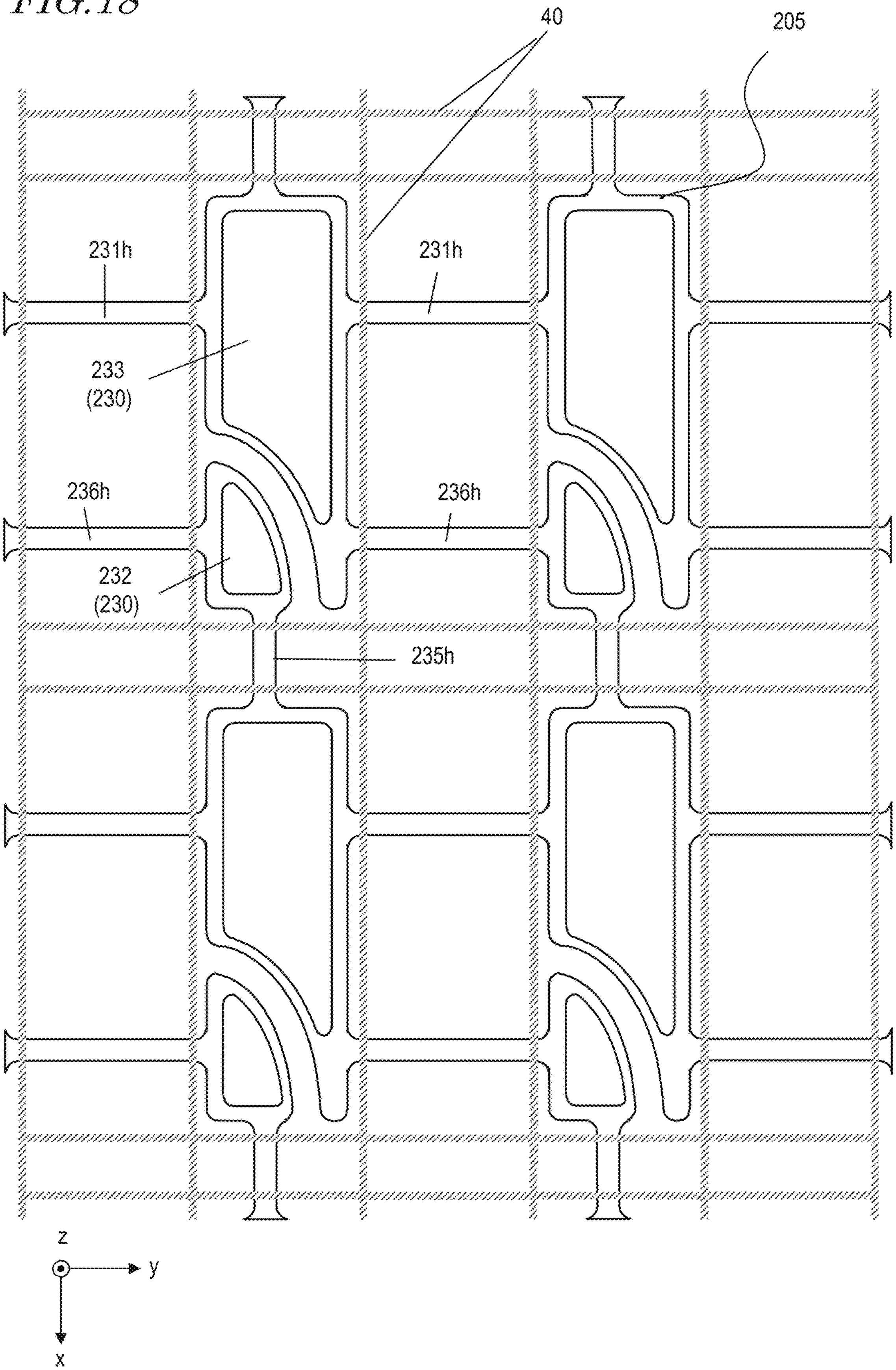


FIG. 18



LIGHT EMITTING DEVICE, RESIN-ATTACHED LEAD FRAME, AND METHODS OF MANUFACTURING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Continuation of copending U.S. patent application Ser. No. 16/392,106, filed Apr. 23, 2019, which claims priority to Japanese Patent Application No. 2018-082516, filed on Apr. 23, 2018, the disclosure of which is hereby incorporated by reference in its entirety.

BACKGROUND

The present application relates to a light emitting device, a resin-attached lead frame, and methods of manufacturing the same.

Light emitting devices incorporating semiconductor light-emitting elements, e.g., light-emitting diodes (LED), are characterized by being smaller in size, having better power efficiency, and being longer-lived than conventional filament-based light sources, and also characterized by having good initial driving characteristics and withstanding repetitive turning ON and OFF. Therefore, such light emitting devices are used as light sources for various applications, such as display devices and lighting fixtures.

Such a light emitting device may include, for example, a base body (also called a package) which is composed of leads and a resin molding, and a light-emitting element that is mounted on the base body. As is disclosed in e.g. Japanese Patent Publication No. 2012-89547, this type of light emitting device is formed by an insert molding using a lead frame and a white resin which is non light-transmitting but light-reflective, where a plurality of resin moldings are formed on the lead frame at a predetermined interval, each resin molding having a recess in which a light-emitting element is to be mounted, and after the light-emitting elements are mounted in the recesses, lead frame and the resin moldings are cut and singulated.

In a light emitting device having a base body as aforementioned, in some cases, the base body is expected to have improved strength.

SUMMARY OF INVENTION

The present disclosure provides a light emitting device and a resin-attached lead frame, these having a base body with improved strength, and methods of producing the same.

A light emitting device according to the present disclosure comprises: a base body including two conductive members each having an upper face and a lower face, a resin body covering a part of each conductive member, and a fiber member placed inside the resin body, a part of the upper face of each conductive member being exposed from the resin body at an upper side of the base body, and a part of the lower face of each conductive member being exposed from the resin body at a lower side of the base body; and a light-emitting element electrically connected to the two conductive members, wherein, the resin body includes an isolation section located between the two conductive members, and includes a pair of sandwiching portions sandwiching the isolation section; the fiber member has a length which is greater than a distance between the two conductive members, and is located at least in an adjoining region of at least one of the pair of sandwiching portions, the adjoining region adjoining the isolation section; and, in the adjoining region, the fiber member extends in a direction which is non-orthogonal to a direction that the pair of sandwiching portions extend.

According to the present disclosure, a light emitting device including a base body with improved base body strength can be realized.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a light emitting device according to a first embodiment.

FIG. **2**A is a plan view of a base body of the light emitting device in FIG. **1**.

FIG. **2**B is a side view of the base body of the light emitting device in FIG. **1**.

FIG. **2**C is a bottom view of the base body of the light emitting device in FIG. **1**.

FIG. **2**D is a plan view of the base body of the light emitting device in FIG. **1**.

FIG. **2**E is a cross-sectional view of the base body taken at line **2**E-**2**E in FIG. **2**A.

FIG. **2**F is a cross-sectional view of the base body taken at line **2**E-**2**E in FIG. **2**A.

FIG. **3**A is a plan view of conductive members of the light emitting device in FIG. **1**.

FIG. **3**B is a side view of conductive members of the light emitting device in FIG. **1**.

FIG. **3**C is a front view of conductive members of the light emitting device in FIG. **1**.

FIG. **4**A is an upper plan view of a resin-attached lead frame which is used for manufacturing the light emitting device of FIG. **1**.

FIG. **4**B is a lower plan view of a resin-attached lead frame which is used for manufacturing the light emitting device of FIG. **1**.

FIG. **4**C is an enlarged upper plan view in which a part of a resin-attached lead frame which is used for manufacturing the light emitting device of FIG. **1** is shown enlarged, and its internal structure is indicated with broken lines.

FIG. **5**A is an upper plan view of a lead frame which is used for manufacturing the light emitting device of FIG. **1**.

FIG. **5**B is an upper plan view of a plurality of fiber members which are used for manufacturing the light emitting device of FIG. **1**.

FIG. **5**C is an upper plan view showing a plurality of fiber members being placed on a lead frame.

FIG. **5**D is an enlarged cross-sectional view showing a lead frame and fiber members that are placed between dies.

FIG. **5**E is an enlarged cross-sectional view showing a lead frame and fiber members that are placed between dies.

FIG. **6** is an upper plan view showing an example where fiber members are composed of a knotless net.

FIG. **7**A is a plan view of a base body used in a light emitting device according to a second embodiment.

FIG. **7**B is a side view of the base body used in a light emitting device according to a second embodiment.

FIG. **7**C is a front view of the base body used in a light emitting device according to a second embodiment.

FIG. **7**D is a bottom view of the base body used in a light emitting device according to a second embodiment.

FIG. **7**E is a cross-sectional view of the base body taken at line **7**E-**7**E in FIG. **7**A.

FIG. **7**F is a cross-sectional view of the base body taken at line **7**F-**7**F in FIG. **7**A.

FIG. **8**A is an upper plan view of a resin-attached lead frame which is used for manufacturing a second light emitting device.

FIG. **8**B is a lower plan view of a resin-attached lead frame which is used for manufacturing the second light emitting device.

FIG. **9**A is an upper plan view of a lead frame which is used for manufacturing the second light emitting device.

FIG. **9**B is a lower plan view of a lead frame which is used for manufacturing the second light emitting device.

FIG. **9**C is an enlarged lower plan view of a lead frame which is used for manufacturing the second light emitting device.

FIG. **10** is a lower plan view showing a plurality of fiber members being placed on a lead frame which is used for manufacturing the second light emitting device.

FIG. **11**A is a plan view of a base body used in a light emitting device according to a third embodiment.

FIG. **11**B is a side view of the base body used in a light emitting device according to a third embodiment.

FIG. **11**C is a rear view of the base body used in a light emitting device according to a third embodiment.

FIG. **11**D is a bottom view of the base body used in a light emitting device according to a third embodiment.

FIG. **11**E is a cross-sectional view of the base body taken at line **11**E-**11**E in FIG. **11**A.

FIG. **11**F is a cross-sectional view of the base body taken at line **11**F-**11**F in FIG. **11**A.

FIG. **11**G is a cross-sectional view of the base body taken at line **11**G-**11**G in FIG. **11**A.

FIG. **11**H is a cross-sectional view of the base body taken at line **11**H-**11**H in FIG. **11**A.

FIG. **12**A is an upper plan view of a lead frame which is used for manufacturing a third light emitting device.

FIG. **12**B is a lower plan view of a lead frame which is used for manufacturing the third light emitting device.

FIG. **13**A is an upper plan view showing enlarged a plurality of fiber members being placed on a lead frame which is used for manufacturing the third light emitting device.

FIG. **13**B is a lower plan view showing enlarged a plurality of fiber members being placed on a lead frame which is used for manufacturing the third light emitting device.

FIG. **14**A is a plan view of a base body used in a light emitting device according to a fourth embodiment.

FIG. **14**B is a side view of the base body used in a light emitting device according to the fourth embodiment.

FIG. **14**C is a front view of the base body used in a light emitting device according to the fourth embodiment.

FIG. **14**D is a bottom view of the base body used in a light emitting device according to the fourth embodiment.

FIG. **14**E is a cross-sectional view of the base body taken at line **14**E-**14**E in FIG. **14**A.

FIG. **14**F is a cross-sectional view of the base body taken at line **14**F-**14**F in FIG. **14**A.

FIG. **15**A is an upper plan view showing enlarged a plurality of fiber members being placed on a lead frame which is used for manufacturing a fourth light emitting device.

FIG. **15**B is a cross-sectional view showing enlarged the plurality of fiber members being placed on a lead frame which is used for manufacturing a fourth light emitting device.

FIG. **16**A is a plan view of a light emitting device according to a fifth embodiment.

FIG. **16**B is a side view of the light emitting device according to the fifth embodiment.

FIG. **16**C is a front view of the light emitting device according to the fifth embodiment.

FIG. **16**D is a bottom view of the light emitting device according to the fifth embodiment.

FIG. **16**E is a cross-sectional view of the base body taken at line **16**E-**16**E in FIG. **16**A.

FIG. **17**A is a plan view of a base body used in the light emitting device according to the fifth embodiment.

FIG. **17**B is a side view of the base body used in the light emitting device according to the fifth embodiment.

FIG. **17**C is a front view of a base body used in the light emitting device according to the fifth embodiment.

FIG. **17**D is a bottom view of a base body used in the light emitting device according to the fifth embodiment.

FIG. **17**E is a cross-sectional view of the base body taken at line **17**E-**17**E in FIG. **17**A.

FIG. **17**F is a cross-sectional view of the base body taken at line **17**F-**17**F in FIG. **17**A.

FIG. **18** is a plan view showing enlarged the placement of a plurality of fiber members and a lead frame which is used for manufacturing a light emitting device according to the fifth embodiment.

DETAILED DESCRIPTION

When a semiconductor device having a base body is mounted on e.g. a printed circuit board, a light emitting device which is supplied from a feeder unit of a chip mounter (surface mounter) is picked up by a nozzle (collet) of the chip mounter, and the semiconductor device having been picked up is mounted on an intended place on the printed circuit board. At this time, the package of the semiconductor device is stressed by the nozzle.

The resin molding composing the base body may contain a filler in order to achieve a high light-shielding ability or light reflectivity. However, as the content ratio of the filler increases, the strength of the resin molding may lower. Therefore, when the semiconductor device possesses a package utilizing a resin molding that profusely contains filler, the package of the light emitting device may be stressed by the pickup nozzle of a chip mounter during mounting, such that fissures, cracks, etc., may occur in the resin molding. In the presence of such fissures or breaking, wire breaks or the like may occur, thus causing malfunctioning of the light emitting device, or lowering hermeticity of the light emitting device and degrading reliability.

In view of such problems, a light emitting device according to the present disclosure possesses a package having a base body with a resin molding whose strength is enhanced with a fiber member(s). Hereinafter, embodiments of light emitting devices according to the present disclosure will be described in detail.

First Embodiment

[Structure of the Light Emitting Device]

FIG. **1** is a perspective view of a light emitting device **101** according to the present disclosure. The light emitting device **101** includes a base body **11**, a light-emitting element **50**, and a sealing member **60**. The respective component elements will be described in detail below. The base body **11** has a recess **11***r*, such that the light-emitting element **50** is placed at the bottom of the recess **11***r*. The sealing member **60** covers the light-emitting element **50**, and is placed inside the recess **11***r*.

[Base Body]

The base body **11** functions as a housing for retaining the light-emitting element **50**. The base body **11** is also called a package. It also provides terminals for electrically connecting the light-emitting element **50** with the outside of the light emitting device **101**. FIGS. **2**A, **2**B, **2**C, and **2**D are respectively a plan view, a side view, a bottom view, and a rear view of the base body **11**; and FIGS. **2**E and **2**F are cross-sectional views of the base body **11** taken at line **2**E-**2**E and line **2**F-**2**F in FIG. **2**A, respectively.

The base body **11** includes a resin body **20**, conductive members **30**, and fiber members **40**. As will be described later, the base body **11** is integrally formed of the resin body **20**, the conductive members **30**, and the fiber members **40**.

The base body **11** has an upper face **10***a* and a lower face **10***b* which is located at the opposite side to the upper face **10***a*. In the present embodiment, in top view, the base body **11** has a substantially rectangular outer shape. Therefore, the base body **11** has four outer lateral faces: an outer lateral face **10***c*, an outer lateral face **10***d* which is located at the opposite side to the outer lateral face **10***c*, an outer lateral face **10***e*, and an outer lateral face **10***f* which is located at the opposite side to the outer lateral face **10***e*. The outer shape of the base body **11** in top view is not limited to a rectangle, but may be any other shape. Moreover, the base body **11** may have an anode mark (or a cathode mark) **10***m* that is formed by removing a portion off one of the corners of the upper face **10***a*. The anode mark **10***m* functions as a mark indicating the polarities of the two conductive members **30**.

The recess **11***r* opens in the upper face **10***a* of the base body **11**. At the bottom face of the recess **11***r*, a part of an upper face **31***a* of the first conductive member **31** (mentioned below) and a part of an upper face **32***a* of the second conductive member **32** (mentioned below) are located and exposed. At the lower face **10***b* of the base body **11**, a part of a lower face **31***b* of the first conductive member **31** and a part of a lower face **32***b* of the second conductive member **32** are exposed.

[Conductive Member]

In the present embodiment, the conductive members **30** include a first conductive member **31** and a second conductive member **32**. The first conductive member **31** has an upper face **31***a* and a lower face **31***b* which is located at the opposite side to the upper face **31***a*. The second conductive member **32** has an upper face **32***a* and a lower face **32***b* which is located at the opposite side to the upper face **32***a*. The first conductive member **31** and the second conductive member **32** are placed side by side, such that the lower face **31***b* and the lower face **32***b* are substantially coplanar with each other. Between the first conductive member **31** and the second conductive member **32**, an isolation section **21***j* of the resin body **20** as will be described below is located.

FIGS. **3**A, **3**B, and **3**C are a plan view, a side view, and a front view, respectively, of the conductive members **30**. The first conductive member **31** and the second conductive member **32** are electrically conductive, and function as electrodes for supplying power to the light-emitting element **50**. Although the present embodiment illustrates the conductive members **30** as including the first conductive member **31** and the second conductive member **32**, the conductive members **30** may include a third conductive member in addition to the first conductive member **31** and the second conductive member **32**. The third conductive member may function as an electrode, or function as a heat dissipation member with high thermal conductivity.

In the present embodiment, the first conductive member **31** and the second conductive member **32** each have a substantially rectangular shape.

The first conductive member **31** includes lateral portions **31***c*, **31***d*, **31***f*, and **31***e*. At the lower face **31***b* side, the first conductive member **31** has a lateral peripheral groove **31***g* in the lateral portions **31***c*, **31***d*, **31***f*, and **31***e*.

Similarly, the second conductive member **32** includes lateral portions **32***c*, **32***d*, **32***f*, and **32***e*. At the lower face **32***b* side, the second conductive member **32** has a lateral peripheral groove **32***g* in the lateral portions **32***c*, **32***d*, **32***f*, and **32***e*. The lateral peripheral grooves **31***g* and **32***g* can formed by an etching process, a pressing process, or the like.

From each of the lateral portions **31***c*, **31***d*, and **31***f* of the first conductive member **31**, an extending portion(s) **31***h* is provided. In the present embodiment, two extending portions **31***h* are provided on each of the lateral portions **31***c* and **31***d*. Similarly, one extending portion **32***h* is provided from each of the lateral portions **32***c*, **32***d*, and **32***e* of the second conductive member **32**. Each extending portion extends toward the outer lateral face **10***c*, **10***d*, **10***e*, or **10***f*.

The lateral portion **31***e* of the first conductive member **31** and the lateral portion **32***f* of the second conductive member **32**, each of which has no extending portion, are opposed to each other via a gap. In this gap, a part of the resin body **20** is located, as will be described later. Moreover, the extending portion **31***h* and the lateral peripheral groove **31***g* of the first conductive member **31** and the extending portion **32***h* and the lateral peripheral groove **32***g* of the second conductive member **32** are embedded inside the resin body **20**.

The lateral peripheral grooves **31***g* and **32***g* which are made in the first conductive member **31** and the second conductive member **32** are provided in order to promote adhesion between the resin body **20** and the first conductive member **31** or second conductive member **32**. In the below-described lead frame, the extending portions **31***h* and **32***h* are a part of a connecting portion that allows sites to become the first conductive member **31** and the second conductive member **32** to be interconnected to an outer frame portion.

In the present embodiment, in top view, the first conductive member **31** has a greater area than does the second conductive member **32**. This is because the light-emitting element **50** is to be disposed on the first conductive member **31**. However, in the case where the light-emitting element **50** is placed on the second conductive member **32**, the area of the second conductive member **32** may be greater than the area of the first conductive member **31** in top view. Further the light-emitting element **50** may be provided across both of the first conductive member **31** and the second conductive member **32**. In this case, in top view, the first conductive member **31** and the second conductive member **32** may have substantially the same area.

Each of the first conductive member **31** and the second conductive member **32** includes a substrate and a metal layer covering the substrate. The substrate is preferably a plate-like member. The substrate may contain a metal such as copper, aluminum, gold, silver, iron, nickel, or an alloy thereof; phosphor bronze; iron-containing copper; or the like. These may be of a single layer, or have a multilayer structure (e.g., a clad material). Copper, which is inexpensive and has high heat-releasing ability, is particularly preferably used for the substrate. The metal layer may contain e.g. silver, aluminum, nickel, palladium, rhodium, gold, copper, or an alloy thereof, etc. Further each of the first conductive member **31** and the second conductive member **32** may have a region where no metal layer is provided. Regarding the first conductive member **31** and the second conductive member **32**, the metal layer that is formed on the upper faces **31***a* and **32***a* may be different from the metal layer that is formed on the lower faces **31***b* and **32***b*. For example, the metal layer formed on the upper faces **31***a* and **32***a* may be a metal layer consisting of multiple layers including a metal layer of nickel, while the metal layer formed on the lower faces **31***b* and **32***b* may be a metal layer that does not include a metal layer of nickel.

Moreover, in the case where a plating layer of silver or a silver alloy is formed on the outermost surface of the first conductive member **31** and the second conductive member **32**, preferably a protective layer of silicon oxide or the like is provided on the surface of the plating layer of silver or a silver alloy. This can suppress the plating layer of silver or a silver alloy from discoloring because of a sulfur component, etc., in the atmospheric air. As the film formation method for the protective layer, a vacuum process such as sputtering may be used, but any other known method may also be used. The protective layer may be formed after the light-emitting element **50** is mounted and furnished with wire connections and before the sealing member **60** is formed, or, formed in a part or a whole of the surface of the sealing member **60** after the sealing member **60** is formed.

[Resin Body]

The resin body **20** includes a pair of sandwiching portions **21***c* and **21***d*, a pair of interconnecting portions **21***e* and **21***f*, and an isolation section **21***j*. The isolation section **21***j* is disposed between the first conductive member **31** and the second conductive member **32**, and retains a gap between the first conductive member **31** and the second conductive member **32** while keeping the first conductive member **31** and the second conductive member **32** spaced apart, whereby the first conductive member **31** and the second conductive member **32** are separated. The sandwiching portions **21***c* and **21***d* are placed so that the isolation section **21***j* and the conductive members **30** (i.e., the first conductive member **31** and the second conductive member **32**) are sandwiched therebetween. The interconnecting portions **21***e* and **21***f* are connected to both ends of the sandwiching portions **21***c* and **21***d*, thereby interconnecting the sandwiching portions **21***c* and **21***d*. Moreover, the interconnecting portions **21***e* and **21***f* are placed so that the first conductive member **31** and the second conductive member **32** are interposed therebetween. The sandwiching portions **21***c* and **21***d* and the interconnecting portions **21***e* and **21***f* constitute a frame shape surrounding the recess **11***r*; as a result of this, at the bottom face of the recess **11***r* (that is, at an upper side of the resin body **20**), a part of the upper face **31***a* of the first conductive member **31** and a part of the upper face **32***a* of the second conductive member **32**, and the isolation section **21***j* are exposed. At a lower side of the resin body **20**, a part of the lower face **31***b* of the first conductive member **31** and a part of the lower face **32***b* of the second conductive member **32**, and the isolation section **21***j* are exposed.

The sandwiching portions **21***c* and **21***d* have adjoining regions **21***cr* and **21***dr*, respectively, that adjoin the isolation section **21***j*. The sandwiching portion **21***c* and the sandwiching portion **21***d* have the outer lateral face **10***c* and the outer lateral face **10***d*, respectively. The interconnecting portion **21***e* and the interconnecting portion **21***f* have the outer lateral face **10***e* and the outer lateral face **10***f*, respectively.

The resin body **20** is made of a thermosetting resin, for example. A preferable thermosetting resin is at least one selected from the group consisting of an epoxy resin, a modified epoxy resin, a silicone resin, a modified silicone resin, an acrylate resin, and an urethane resin. In particular, epoxy resins, modified epoxy resins, silicone resins, modified silicone resins, and the like can be used. Alternatively, the resin body **20** may be made of a thermoplastic resin.

In addition to the resin, the resin body **20** may also contain a filler, an acid anhydride, an antioxidant, a release agent, a curing catalyst, a light stabilizer, a lubricant, and the like. For example, as a filler, particles, short fibers, etc., of a light-reflective substance or a light-shielding substance may be dispersed in a thermosetting resin. Other than adjusting the optical properties as mentioned above, the filler may also be used for adjusting thermal properties such as thermal conductivity of the resin.

Examples of particles of a light-reflective substance that may be used as the filler include particles of titanium oxide, silicon oxide, zirconium oxide, magnesium oxide, calcium carbonate, calcium hydroxide, calcium silicate, zinc oxide, barium titanate, potassium titanate, alumina, aluminum nitride, boron nitride, mullite, and the like. By using particles of any such material, light can be efficiently reflected. Examples of particles of a light-shielding substance to be used as the filler include coloring pigment particles containing carbon black or a transition metal compound. As the filler, each of these may be used alone, or two or more of them may be used in combination. This allows the light reflectance and light-shielding ability of the resin containing the filler to be adjusted, and also the coefficient of linear expansion of the resin to be adjusted.

[Fiber Member]

The fiber members **40** are located inside the adjoining region(s) **21***cr* and/or **21***dr* of at least one of the sandwiching portions **21***c* and **21***d*. Inside the adjoining region **21***cr* or the adjoining region **21***dr*, the fiber members **40** extend in a direction which is non-orthogonal to the direction L that the sandwiching portion **21***c* or the sandwiching portion **21***d* extends. A direction which is orthogonal to the direction L that the sandwiching portion **21***c* or **21***d* extends may be any direction on a plane P that is perpendicular to the direction L; therefore, to "extend in a direction which is non-orthogonal" thereto means extending in any direction that is not on the plane P. In other words, the direction that the fiber members **40** extend makes an angle θ of 0° or more but less than 90° with the direction L that the sandwiching portion **21***c* or **21***d* extends. As will be described later, from the standpoint of enhancing the strength of the sandwiching portion **21***c* or **21***d*, the angle θ is preferably small. For example, the angle θ is preferably not less than 0° and not more than 15°, more preferably not less than 0° and not more than 10°, and still more preferably not less than 0° and not more than 5°.

In the present embodiment, as shown in FIGS. **2**A, **2**B, **2**C, **2**D, **2**E, and **2**F, one of the fiber members **40** is located inside the sandwiching portion **21***c*, including inside the adjoining region **21***cr* of the sandwiching portion **21***c*. Another fiber member **40** is located inside the sandwiching portion **21***d*, including inside the adjoining region **21***dr* of the sandwiching portion **21***d*. The fiber members **40** located inside the adjoining regions **21***cr* and **21***dr* each have a length greater than a distance between the first conductive member **31** and the second conductive member **32**. More specifically, the base body **11** includes four fiber members **40**, such that the four fiber members **40** are respectively embedded in the sandwiching portions **21***c* and **21***d* and the interconnecting portions **21***e* and **21***f*, along the directions that the sandwiching portions **21***c*, **21***d*, **21***e*, and **21***f* extend. Since the fiber members **40** are embedded in the sandwiching portions **21***c* and **21***d* along the direction L that the sandwiching portion **21***c* or **21***d* extends, the direction that the fiber members **40** extend is parallel to the direction L that the sandwiching portion **21**c or **21**d extends. In other words, the direction that the fiber members **40** in the sandwiching portions **21**c and **21**d extend is a direction which is non-orthogonal to the direction that the sandwiching portion **21**c or **21**d extends. This further enhances the strength of the base body **11**.

End faces of the fiber members **40** embedded in the sandwiching portions **21**c and **21**d are exposed at the outer lateral faces **10**e and **10**f. End faces of the fiber members **40** embedded in the interconnecting portions **21**e and **21**f are exposed at the outer lateral faces **10**c and **10**d. Moreover, within the sandwiching portions **21**c and **21**d and the interconnecting portions **21**e and **21**f, the fiber members **40** are located downward (i.e., closer to the lower face **10**b) of the extending portions **31**h and **32**h of the first conductive member **31** and the second conductive member **32**). Preferably, the fiber members **40** are closely located to the lower face **10**b, for greater enhancement in the strength of the base body **11**. Moreover, the fiber members **40** may be located upward (i.e., closer to the upper face **10**a) of the extending portions **31**h and **32**h).

Each fiber member **40** may be a monofilament, or a bundle of multiple fibers, e.g., a parallel fiber bundle or a twisted thread. From the standpoint of capability of impregnation with resin and the standpoint of joining with the resin, a bundle of fibers is more preferable. In the case where the fiber member **40** is a monofilament, the direction that the fiber member **40** extends coincides with the direction of the monofilament. In the case where the fiber member **40** is a bundle of fibers, the direction that the fiber member **40** extends may not necessarily coincide with the direction of the respective fibers constituting the bundle of fibers. A twisted thread can be formed by stranding together short fibers or long fibers. When twisted, the orientation of each fiber in the bundle of fibers will not be identical with the direction that the bundle of fibers itself extends; it will be inclined in the case of short fibers, or helical in the case of long fibers. As the fibers in a bundle of fibers, organic fibers such as glass fibers, carbon fibers, or aramid fibers (synthetic fibers or natural fibers) may be used. One kind of fiber, or a combination of a plurality of kinds of fibers may be used. Long fibers are preferable to short fibers, because the initial tensile resistance (apparent Young's modulus, initial elastic modulus) of the fiber members **40** will be increased.

In order to keep the bundle of fibers together, or improve its handling, each fiber member **40** may contain resin, such that a monofilament or a bundle of fibers is impregnated with the resin. Moreover, as will be described later, each fiber member **40** may constitute a knotless net, a plain weave, or the like. The thickness of each fiber member **40** is preferably smaller than the depth of the lateral peripheral grooves **31**g and **32**g. A knotless net is fibers being stranded (or woven) into a net form, including e.g. a perforation type knotless net, a staggered knotless net, a hexagonal knotless net, a Raschel net, a minnow net, and the like. A knotless net is preferable because it has not knots and therefore presents planar joints.

[Light-Emitting Element]

As the light-emitting element **50**, a semiconductor light-emitting element such as a light-emitting diode device can be used. Although the present embodiment illustrates that the light emitting device **101** includes one light-emitting element, it may include two light-emitting elements, or three or more light-emitting elements. It is particularly preferable that the light-emitting element **50** contains a III-V group compound semiconductor, e.g., a nitride semiconductor ($In_xAl_yGa_{1-x-y}N$, $0 \le x$, $0 \le y$, $x+y \le 1$), that is capable of light emission in the ultraviolet to visible ranges.

In the recess **11**r, the light-emitting element **50** is connected to the first conductive member **31** by a connecting member, thus being disposed on the first conductive member **31**. The connecting member may be, for example: resins including the resin materials exemplified for the resin body **20**; tin-bismuth based, tin-copper based, tin-silver based, gold-tin based, or other solders; electrically conductive pastes or bumps, e.g., silver, gold, or palladium; or brazing materials such as anisotropic conductive materials or low-melting point metal materials. The light-emitting element **50** and the first conductive member **31** and the second conductive member **32** may also be electrically connected via wires **51** and **52**.

[Sealing Member]

The sealing member **60** transmits light from the light-emitting element **50**, and yet protects the light-emitting element **50** from the external environment. As the sealing member, a resin, glass, etc., that is selected from the group consisting of epoxy resins, modified epoxy resins, silicone resins, modified silicone resins, acrylate resins, and urethane resins can be used.

In order to confer certain functions to the sealing member **60**, the sealing member **60** may contain at least one selected from the group consisting of a wavelength-converting substance, a filler, a diffusing agent, a pigment, a fluorescent substance, and a reflective substance. As the diffusing agent, barium titanate, titanium oxide, aluminum oxide, silicon oxide, or the like can be suitably used. For the purpose of suppressing light of unwanted wavelengths, an organic or inorganic coloring dye or a coloring pigment may be contained. A wavelength-converting substance absorbs light from the semiconductor light-emitting element, and effects wavelength conversion into light of a different wavelength, which may be e.g. particles of nitride-based phosphor, oxynitride-based phosphor, SiAlON-based phosphor, or the like. One kind of wavelength-converting substance, or two or more kinds of wavelength-converting substances in combination, may be used in order to realize not only blue, green, yellow, red, etc., but also intermediate colors therebetween, such as blue-green, yellow-green, orange, etc.

The light emitting device **101** may further include a protection element such as a Zener diode. In this case, the protection element can be placed on the first conductive member **31** or the second conductive member **32**. In this case, within the recess **11**r, the protection element is also covered by the sealing member **60**. Alternatively, the protection element may be placed inside the resin body **20**.

[Characteristic Aspects of the Light Emitting Device]

In the light emitting device **101**, the isolation section **21**j of the resin body **20** is located in the gap between the first conductive member **31** and the second conductive member **32**. Therefore, as the light emitting device **101** is picked up by a chip mounter, etc., during mounting of the light emitting device **101**, the base body **11** of the light emitting device **101** may be stressed, thereby likely causing fissures, cracks, etc., at the position of the isolation section **21**j. In the light emitting device **101** according to the present disclosure, the fiber members **40** are placed in the adjoining regions **21**cr and **21**dr of the sandwiching portions **21**c and **21**d, which adjoin the isolation section **21**j, whereby the strength of the adjoining regions **21**cr and **21**dr of the sandwiching portions **21**c and **21**d is enhanced, so that fissures, cracks, etc., due to stress can be suppressed. Moreover, since the fiber members **40** are placed in the entirety of each sandwiching portion **21**c, **21**d and each interconnecting portion **21**e, **21**f, the strength of the entire resin body **20** is enhanced. As a result, with the light emitting device **101** according to the present disclosure, malfunctioning due to external force is suppressed, and reliability can be enhanced. Moreover, various fillers may be adequately added to the resin body **20** in order to confer thereto functions such as light reflectivity, light-shielding ability, etc.; thus, optical characteristics of the light emitting device **101** can be further enhanced.

[Method of Manufacturing the Light Emitting Device]

The light emitting device **101** can be produced by: step (A) of manufacturing a resin-attached lead frame in which base bodies **11** as aforementioned are integrated; step (B) of placing a light-emitting element **50** in the recess **11***r* of each base body **11** in the resin-attached lead frame, and electrically connecting the light-emitting element **50** with a first conductive portion to become the first conductive member **31** and a second conductive portion to become the second conductive member **32**; step (C) of placing a sealing member **60** so as to cover the light-emitting element **50** in the recess **11***r*; and step (D) of singulating the resin-attached lead frame by cutting it along cut lines, thereby obtaining individual light emitting devices **101**. Hereinafter, the respective steps will be described in order.

Step (A)

[Structure of the Resin-Attached Lead Frame and Method of Manufacturing the Resin-Attached Lead Frame]

FIG. **4**A and FIG. **4**B are an upper plan view and a lower plan view, respectively, of the resin-attached lead frame **151**. FIG. **4**C is an enlarged upper plan view in which a part of the resin-attached lead frame is shown enlarged, and its internal structure is indicated with broken lines. FIG. **5**A is an upper plan view of a lead frame which is used for the resin-attached lead frame **151**. In these figures, for ease of understanding, three-dimensional directions are indicated by a right-hand orthogonal coordinate system. Specifically, in each diagram, the downward direction along the vertical direction is represented as the x axis, whereas the rightward direction, which is perpendicular to the x axis, is represented as the y axis. Moreover, a direction which is perpendicular to the x axis and they axis and coming out of the plane of the figure is defined as the z axis. These may instead be referred to as the first, second, and third axes. The first axis and the second axis may not be orthogonal to each other. Moreover, any arrangement along the x axis direction will be referred to as a column, and any arrangement along the y axis direction will be referred to as a row. A direction which is parallel to the x axis direction may be referred to as the first direction; a direction which is parallel to the y axis direction may be referred to as the second direction; and a direction which is parallel to the z axis direction may be referred to as the third direction.

The resin-attached lead frame **151** includes a lead frame **201**, a resin member **220**, and fiber members **40**. The lead frame **201** includes a plurality of conductive portions **230**. The plurality of conductive portions **230** are arrayed along the x axis and the y axis direction. Each conductive portion **230** includes a plurality of conductive subportions that are arranged along the x axis direction. In the present embodiment, each conductive portion **230** includes a first conductive subportion **231** and a second conductive subportion **232**. The first conductive subportion **231** has an upper face **231***a* and a lower face **231***b*, whereas the second conductive subportion **232** has an upper face **232***a* and a lower face **232***b*. When the resin-attached lead frame **151** is singulated, i.e., separated into a plurality of base bodies **11**, the first conductive subportion **231** and the second conductive subportion **232** are to become the first conductive member **31** and the second conductive member **32** of each base body **11**.

In the lead frame **201**, the first conductive subportions **231** and the second conductive subportions **232** are alternately arranged along the x axis direction. A plurality of first conductive subportions **231** are arranged along the y axis direction, and a plurality of second conductive subportions **232** are arranged along the y axis direction. Along the x axis direction, the first conductive subportion **231** and the second conductive subportion **232** of each conductive portion **230** are spaced apart from each other by a gap **230***j* in which the isolation portion **223** of the resin member is placed. At the lower face side of the first conductive subportion **231** and the second conductive subportion **232**, lateral peripheral grooves **231***g* and **232***g* corresponding to the lateral peripheral grooves **31***g* and **32***g* are provided.

Each conductive portion **230** is connected to an adjacent conductive portion **230** along the x axis direction or the y axis direction, via connecting portions **231***h*, **232***h* and **235***h*. In the present embodiment, the first conductive subportion **231** is connected to the first conductive subportion **231** of an adjacent conductive portion **230** on the right (or left) side along the y axis direction, via two connecting portions **231***h*. The second conductive subportion **232** is connected to the second conductive subportion **232** of an adjacent conductive portion **230** on the right (or left) side along the y axis direction, via a single connecting portion **232***h*. On the other hand, along the x axis direction, the first conductive subportion **231** is connected to the second conductive subportion **232** of an adjacent conductive portion **230** via a connecting portion **235***h*. Regarding the z axis direction, each conductive portion **230** has an upper face and a lower face.

The array of plural sets of conductive portions **230** along the x axis direction and the y axis direction is connected, by connecting portions **231***h*, **232***h* and **235***h*, to an outer frame portion **240** that surrounds the array of plural sets of conductive portions **230**.

By using a plate made of any of the materials exemplified for the substrate of the first conductive member **31** and the second conductive member **32**, the lead frame **201** can be formed by performing a stamping process, an etching process, or the like to create incisions, steps, and concavities and convexities. The incisions, steps, and concavities and convexities can be created by combining stamping processes and/or pressing processes. In the case where etching processes are to be performed, an etching process to penetrate through the lead frame and a one-sided etching process which stops short of penetration may be combined to create the incisions, steps, and concavities and convexities. Thereafter, the surface of the plate of the processed substrate may be covered with a metal layer, thereby providing the lead frame **201**. As obtained above, the lead frame is provided.

The resin member **220** includes a plurality of first portions **221**, a plurality of second portions **222** (see FIGS. **4**A and **4**B), and a plurality of isolation portions **223**. Each first portion **221** extends along the first direction, and is placed between each column of conductive portions **230** that are arranged along the x axis direction. Each second portion **222** extends along the second direction intersecting the first direction, and is placed between each row of conductive portions **230** that are arranged along the y axis direction. Each isolation portion **223** is placed between the first conductive subportion **231** and the second conductive subportion **232** of the respective conductive portion **230**. The first portions **221** and the second portions **222** surround each conductive portion **230** and each isolation portion **223**, thereby constituting a latticework portion **234**. On the upper face side of the latticework portion **234**, a plurality of recesses **211***r* each corresponding to the recess **11***r* of the base body **11** are located. At the bottom face of each recess **211***r*, a part of the upper face **231***a* of the first conductive subportion **231** and a part of the upper face **232***a* of the second conductive subportion **232** are exposed. Also, the isolation portion **223** is exposed at the bottom of the recess **211***r*. On the lower face side of the latticework portion **234**, a part of the lower face **231***b* of the first conductive subportion **231** and a part of the lower face **232***b* of the second conductive subportion **232** are exposed. One end and the other end of each isolation portion **223** are connected to the respective first portions **221** on its right and left sides, such that each first portion **221** includes an adjoining region **221***r* (see FIG. **4**C) adjoining the isolation portion **223**.

When the resin-attached lead frame **151** is singulated, i.e., separated into a plurality of base bodies **11**, the resin member **220** becomes the resin body **20** of each base body **11**. Moreover, the first portions **221** become the sandwiching portions **21***c* and **21***d* of each resin body **20**, and the second portions **222** become the interconnecting portions **21***e* and **21***f* of each resin body **20**. The resin member **220** is made of the material of the resin body **20** as aforementioned.

Within each first portion **221** of the resin member **220**, fiber members **40** are placed, at least inside the adjoining region **221***r*. Each fiber member **40** placed inside the adjoining region **221***r* has a length which is greater than a distance between the first conductive subportion **231** and the second conductive subportion **232**. The fiber members **40** extend in a direction which is non-orthogonal to the x axis direction. Since the first portions **221** extend along the first direction which is parallel to the x axis direction, the fiber members **40** extend so as to intersect the yz plane, which is perpendicular to the x axis. In the present embodiment, fiber members **40** are placed on each of the four sides surrounding each recess **211***r* of the resin member **220**. Specifically, each first portion **221** has two fiber members **40** embedded therein, such that the two fiber members **40** respectively adjoin the two columns of conductive portions **230** that are adjacent to the first portion **221** on its both sides along the y axis direction. Moreover, each second portion **222** has two fiber members **40** embedded therein, such that the two fiber members **40** respectively adjoin the two rows of conductive portions **230** that are adjacent to the second portion **222** on its both sides along the x axis direction.

In the resin-attached lead frame **151**, the two fiber members **40** are embedded inside the adjoining region **221***r* of each first portion **221**. As a result, when the resin-attached lead frame **151** is singulated into base bodies **11** by cutting each first portion **221** apart between the two fiber members **40** (and also cutting apart each second portion **222**), the base bodies **11** will possess the aforementioned characteristic aspects.

The resin-attached lead frame **151** is produced by insert molding, for example.

First, as shown in FIG. **5**A, the lead frame **201** having the above-described structure is provided. Moreover, as shown in FIG. **5**B, an array of plural fiber members **40** arranged along the x axis direction and the y axis direction is provided. At this time, the plurality of fiber members **40** may be arrayed along the x axis direction and the y axis direction; the fiber members **40** may be impregnated with resin so that their respective positions are temporarily fixed; and the resin may be semi-cured while the fiber members **40** are kept in the predetermined positions, for better temporary fixation.

Thereafter, as shown in FIG. **5**C, the lead frame **201** is overlaid on the plurality of fiber members **40**. The plurality of fiber members **40** are aligned so as to overlap the connecting portions **231***h*, **232***h*, and **235***h* of the lead frame **201** in top view.

Thereafter, as shown in FIG. **5**D and FIG. **5**E, the lead frame **201** and the fiber members **40** having been aligned are sandwiched between an upper die **261** and a lower die **262**. As shown in FIG. **5**D, the fiber members **40** are placed in a region below the connecting portions **231***h*, **232***h* and **235***h* (FIG. **5**C); and as shown in FIG. **5**E, where the connecting portions **231***h*, **232***h*, and **235***h* do not exist, the fiber members **40** are placed closely to the lateral peripheral grooves **231***g* and **232***g*. Cavities are created by the sandwiching positioning of the upper die **261** and the lower die **262**. The cavities are spaces corresponding to the sandwiching portions **21***c* and **21***d*, the interconnecting portions **21***e* and **21***f*, and the isolation sections **21***j* of the resin bodies **20**. Regions of the upper face **201***a* of the lead frame **201** that are in contact with the upper die **261** are regions of the conductive members **30** that will become exposed at the respective bottom faces of the recesses **211***r*. Regions of the lower face **201***b* of the lead frame **201** that are in contact with the lower die **262** are regions of the conductive members **30** that will become exposed at the respective lower faces of the base bodies **11**.

Next, in the cavities sandwiched between the upper die **261** and the lower die **262**, an uncured material of the resin body **20** is injected and heated, thereby allowing the uncured material of the resin body **20** to cure. Thereafter, the dies **261** and **262** are removed, whereby the resin-attached lead frame **151** is completed.

Step (B)

The light-emitting elements **50** are placed on the lead frame **201**. Each light-emitting element **50** is joined to the first conductive subportion **231** that is exposed in the respective recess **211***r* in the resin-attached lead frame **151**. Furthermore, each light-emitting element **50** is connected to the first conductive subportion **231** and the second conductive subportion **232** via wires **51** and **52**.

Step (C)

Furthermore, an uncured material of the sealing member **60** is injected in each recess **211***r* so as to cover the light-emitting element **50** and the wires **51** and **52**, and thereafter cured, thus allowing the sealing member **60** to be placed within the recesses **211***r*.

Step (D)

In order to effect singulation, the resin-attached lead frame **151** is cut along cut lines which are indicated with dot-dash lines in FIG. **4**C. The resin member **220** and the fiber members **40** of the resin-attached lead frame **151**, and the connecting portions **231***h*, **232***h*, and **235***h* of the lead frame **201** are simultaneously cut. A dicing saw may be used for the cutting, for example. As a result of this, a plurality of singulated light emitting devices **101** are produced.

Although the present embodiment illustrates the each fiber member as a bundle of fibers in the figures, any of the aforementioned variety of fiber members can be used. For example, as shown in FIG. **6**, holes may be formed in a knotless net, or a sheet-shaped fiber member such as a reticulated fiber or nonwoven fabric, and portions corresponding to the plurality of fiber members **40** arrayed along the x axis direction and they axis direction as illustrated in FIG. **5**B may be formed therein. Using such a member will make it unnecessary to align a plurality of fiber members **40**, thereby facilitating the production of the resin-attached lead frame **151**.

Second Embodiment

A second embodiment of a light emitting device according to the present disclosure will be described. The light emitting device according to the second embodiment is identical to the light emitting device according to the first embodiment, except mainly for a base body having a different structure. Therefore, the structure of the base body will be mainly described.

FIGS. **7**A, **7**B, **7**C, and **7**D are a plan view, a side view, a front view, and a bottom view, respectively, of a base body **12** used in the light emitting device according to the second embodiment; and FIGS. **7**E and **7**F are cross-sectional views of the base body **12** taken at line **7**E-**7**E and line **7**F-**7**F, respectively, in FIG. **7**A.

End faces of extending portions **31***h* and **32***h* of the base body **12** are exposed at an outer lateral face **10***e* of an interconnecting portion **21***e* and an outer lateral face **10***f* of an interconnecting portion **21***f*, but are not exposed at an outer lateral face **10***c* of a sandwiching portion **21***c* and an outer lateral face **10***d* of a sandwiching portion **21***d*. In other words, the extending portions **31***h* and **32***h* are not provided in the sandwiching portions **21***c* and **21***d*. Moreover, fiber members **40** are embedded in the sandwiching portions **21***c* and **21***d*, but not embedded in the interconnecting portions **21***e* and **21***f*. In other words, the fiber members **40** are not provided under the extending portions **31***h* and **32***h*.

The fiber members **40** are located inside the adjoining regions **21***cr* and **21***dr* of the sandwiching portions **21***c* and **21***d*, and extend along the direction that the sandwiching portion **21***c* or **21***d* extends. In other words, the fiber members **40** extend in a direction which is non-orthogonal to the direction that the sandwiching portion **21***c* or **21***d* extends. This enhances the strength of the base body **11**, as has been described in the first embodiment.

FIG. **8**A and FIG. **8**B are an upper plan view and a lower plan view, respectively, of a resin-attached lead frame **152** in which such base bodies **12** are integrated. FIG. **9**A and FIG. **9**B are an upper plan view and a lower plan view, respectively, of a lead frame **202** which is used in the resin-attached lead frame **152**; and FIG. **9**C is a partially enlarged view of the lower plan view. In these figures, the upward direction along the vertical direction is represented as the y axis, whereas the rightward direction, which is perpendicular to the y axis, is represented as the x axis.

The resin-attached lead frame **152** differs from the resin-attached lead frame **151** with respect to the structure of the lead frame **202** and placement of the fiber members **40**.

In the lead frame **202**, each first conductive subportion **231** is connected to the second conductive subportion **232** of an adjacent conductive portion **230**, along the x axis direction, by two connecting portions **235***h* (see FIG. **9**A). The connecting portions **235***h* are connected by a connecting portion **234***h*, along the y axis direction. Each first conductive subportion **231** and each second conductive subportion **232** are not connected, via any connecting portion, to an adjacent first conductive subportion **231** and an adjacent second conductive subportion **232** along the y axis direction. Therefore, before an insert molding, when fiber members **40** extending along the x axis direction are to be placed along the first conductive subportions **231** and the second conductive subportions **232**, which themselves are alternately arranged along the x axis direction, there is no structure to stably support the fiber members **40** near each first conductive subportion **231** and each second conductive subportion **232**.

In the present embodiment, in order to support the fiber members **40**, the lead frame **202** includes an outer frame portion **240** that surrounds a plural sets of conductive members **30**, and a plurality of hooks **241** located inside the outer frame portion **240** (see FIGS. **9**B and **9**C). In the present embodiment, each hook **241** is shaped as a protrusion from the lower face **202***b* of the lead frame **202**, the hook **241** protruding in the z axis direction from the surroundings; specifically, a recess **242** is provided around each hook **241** of the outer frame portion **240**. As a result, at the positions of the hooks **241**, the lead frame **202** has the same thickness as that of the outer frame portion **240**; in the recesses **242**, however, the lead frame **202** has a smaller thickness than that of the outer frame portion **240**. By engaging the fiber members **40** on the hooks **241**, the fiber members **40** can be placed near the first conductive subportions **231** and the second conductive subportions **232**. For example, the hooks **241** may be placed inside the outer frame portion **240** in such a manner that plural sets of conductive members **30** that are arranged along the x axis direction are interposed therebetween.

Except for the placement of the fiber members **40**, the resin-attached lead frame **152** can be produced in a manner similar to the resin-attached lead frame **151** according to the first embodiment.

First, the lead frame **202**, having the hooks **241** as shown in FIG. **9**A and FIG. **9**B provided therein, is produced. Thereafter, as shown in FIG. **10**, the fiber members **40** are engaged on the hooks **241** of the lead frame **202**. In order to prevent loosening of the fiber members **40** engaged on the hooks **241**, before engagement of the fiber members **40** onto the hooks **241**, the fiber members **40** may be impregnated with an uncured resin material, and after the fiber members **40** are engaged on the hooks **241**, preliminary curing of the resin material may be effected. This suppresses flexure of the fiber members **40**, thereby allowing the fiber members **40** to be stably placed relative to the lead frame **202**. Thereafter, the lead frame **202** having the fiber members **40** attached thereto may be sandwiched between upper and lower dies, and subjected to an insert molding where resin is injected for integration, whereby the resin-attached lead frame **152** can be obtained.

Although the present embodiment illustrates the hooks **241** as protrusions in the z axis direction, the lead frame **202** may include any other type of hooks. For example, the hooks may be protrusions, bumps, etc., extending in the y axis direction; the fiber members **40** can also be engaged on these.

Third Embodiment

A third embodiment of a light emitting device according to the present disclosure will be described. The light emitting device according to the third embodiment is identical to the light emitting device according to the first embodiment, except mainly for a base body having a different structure. Therefore, the structure of the base body will be mainly described.

FIGS. **11**A, **11**B, **11**C, and **11**D are a plan view, a side view, a rear view, and a bottom view, respectively, of a base body **13** used in the light emitting device according to the third embodiment; and FIGS. **11**E, **11**F, **11**G, and **11**H are cross-sectional views of the base body **13** taken at line **11**E-**11**E, line **11**F-**11**F, line **11**G-**11**G, and line **11**H-**11**H respectively, in FIG. **11**A.

In addition to a first conductive member **31** and a second conductive member **32**, the base body **13** includes a third conductive member **33**. A part of an upper face **33***a* of the third conductive member **33** is exposed at the bottom face in a recess **11***r*, whereas a part of a lower face **33***b* is exposed at a lower face **10***b* of the base body **13**. In addition to an isolation section **21***j*, a resin body **20** includes an isolation section **21***k*, such that a sandwiching portions **21***c* and **21***d* sandwich the isolation sections **21***j* and **21***k*. Therefore, the sandwiching portion **21***c* includes two adjoining regions **21***cr* respectively adjoining the isolation sections **21***j* and **21***k*. Similarly, the sandwiching portion **21***d* includes two adjoining regions **21***dr* respectively adjoining the isolation sections **21***j* and **21***k*. Fiber members **40** are placed inside the respective adjoining regions **21***cr* and **21***dr*, and extend in a direction which is non-orthogonal to the direction that the sandwiching portion **21***c* or **21***d* extends.

Inside the adjoining region **21***cr* or **21***dr* adjoining the isolation section **21***j*, each fiber member **40** includes a second fiber portion **40***b* which is located beneath the extending portions **31***h* and **32***h* and a first fiber portion **40***a* which is located on the extending portions **31***h* and **32***h*. Between the extending portions **31***h* and **32***h*, the second fiber portion **40***b* and the first fiber portion **40***a* come in contact with each other. Similarly, inside the adjoining region **21***cr* or **21***dr* adjoining the isolation section **21***k*, each fiber member **40** includes a second fiber portion **40***b* which is located beneath the extending portions **31***h* and **33***h* and a first fiber portion **40***a* which is located on the extending portions **31***h* and **33***h*. Between the extending portions **31***h* and **33***h*, the second fiber portion **40***b* and the first fiber portion **40***a* come in contact with each other.

The two fiber members **40** located inside the adjoining regions **21***cr* and **21***dr* adjoining the isolation section **21***j* are separated from the two fiber members **40** located inside the adjoining regions **21***cr* and **21***dr* adjoining the isolation section **21***k*. Moreover, the end faces of the fiber members **40** are not exposed at an outer lateral face **10***e* and an outer lateral face **10***f*; rather, the end faces of the fiber members **40** are located inside the resin body **20**.

The base body **13** includes three conductive members. Therefore, the light emitting device according to the third embodiment can be used as a 3-terminal device, and may be implemented as, for example, a light emitting device having two light-emitting elements.

Moreover, as in the first and second embodiments, the fiber members **40** are located inside the adjoining regions **21***cr* and **21***dr* of the sandwiching portions **21***c* and **21***d*, and extend along the direction that the sandwiching portion **21***c* or **21***d* extends. This enhances the strength of the base body **13**. Furthermore, each fiber member **40** includes two fiber portions which are disposed so as to sandwich two extending portions from above and below, and yet come in contact with each other in between the extending portions. Thus, fiber members **40** can be fixedly placed onto the extending portions. This allows the fiber members **40** to be arranged only in places where the strength of the base body **13** is likely to deteriorate, thereby reducing the amount of fiber members **40** used. Moreover, an implementation is possible such that the fiber members **40** are not exposed at the outer lateral faces. Therefore, no interfaces between the fiber members **40** and the resin body **20** are created at the outer lateral faces, whereby the hermeticity and environmental resistance of the base body **13** can be enhanced.

A resin-attached lead frame **152** in which such base bodies **13** are integrated can be produced by placing fiber members **40** having the aforementioned characteristic aspects on a lead frame. Hereinafter, a resin-attached lead frame according to the present embodiment will be described mainly with respect to the placement of the lead frame and the fiber members. FIG. **12**A and FIG. **12**B are an upper plan view and a lower plan view, respectively, of a lead frame **203** which is used for the resin-attached lead frame according to the present embodiment.

In the lead frame **203**, the conductive portions **230**, which are arranged along the x axis direction, include: first conductive subportions **231** to become the first conductive members **31**; second conductive subportions **232** to become the second conductive members **32**; and third conductive subportions **233** to become the third conductive members **33**. Every second conductive subportion **232** and every third conductive subportion **233** are arranged so that a first conductive subportion **231** is interposed therebetween. Each second conductive subportion **232** is connected to the third conductive subportion **233** of an adjacent conductive portion **230** along the x axis direction, via a connecting portion (first connecting portion) **235***h*. Each first conductive subportion **231**, each second conductive subportion **232**, and each third conductive subportion **233** are connected to the first conductive subportion **231**, the second conductive subportion **232**, and the third conductive subportion **233** of an adjacent conductive portion **230** along the y axis direction, respectively, via connecting portions (second connecting portions) **231***h*, **232***h*, and **233***h*. The connecting portion **231***hs*, **232***h*, and **233***h* correspond to the extending portions **31***h*, **32***h*, and **33***h*, respectively.

FIG. **13**A and FIG. **13**B are, respectively, an upper plan view and a lower plan view showing enlarged some fiber members **40** being placed on the lead frame **203**. The first fiber portions **40***a* of the fiber members **40** are located astride the connecting portions **231***h* and the connecting portions **232***h* from above, whereas the second fiber portions **40***b* of the fiber members **40** are located astride the connecting portions **231***h* and the connecting portions **232***h* from below. Each first fiber portion **40***a* is adhesively bonded to the corresponding second fiber portion **40***b*, in between the connecting portion **231***h* and the connecting portion **232***h*. On the other hand, the first fiber portions **40***a* of the fiber members **40** are located astride the connecting portions **231***h* and the connecting portions **233***h* from above, whereas the second fiber portions **40***b* of the fiber members **40** are located astride the connecting portions **231***h* and the connecting portions **233***h* from below. Each first fiber portion **40***a* is adhesively bonded to the corresponding second fiber portion **40***b*, in between the connecting portion **231***h* and the connecting portion **233***h*.

FIG. **13**A and FIG. **13**B indicate with dot-dash lines the cut lines to be used when the resin-attached lead frame is singulated into separate base bodies **13**. Although the first fiber portions **40***a* and the second fiber portions **40***b* are placed between a plurality of dot-dash lines extending along the x axis direction and the y axis direction, the first fiber portions **40***a* and the second fiber portions **40***b* never intersect the cut lines. Such placement prevents cross sections of the fiber members **40** from becoming exposed at the outer lateral faces when the resin-attached lead frame is singulated. Because the fiber members **40** do not need to be cut during singulation, cutting is also made easier.

The aforementioned arrangement of fiber members **40** can be obtained by using, for example, so-called pre-pregs, i.e., fiber members impregnated with resin and semi-cured, or fiber members impregnated with uncured resin.

For example, semi-cured first fiber portions **40***a* and second fiber portions **40***b* may be placed above and below the connecting portions **231***h* and the connecting portions **232***h*, and above and below the connecting portions **231***h* and the connecting portions **233***h*. While keeping each first fiber portion **40***a* and the corresponding second fiber portions **40***b* in contact with each other in between the connecting portions, they may be subjected to heating, thereby curing and joining them. Thereafter, the lead frame **203** having the fiber members **40** placed thereon may be sandwiched between dies, and subjected to an insert molding and resin curing as has been described in the first embodiment, whereby the resin-attached lead frame **153** can be produced.

Fourth Embodiment

A fourth embodiment of a light emitting device according to the present disclosure will be described. The light emitting device according to the fourth embodiment is identical to the light emitting device according to the first embodiment, except mainly for a base body having a different structure. Therefore, the structure of the base body will be mainly described.

FIGS. **14**A, **14**B, **14**C, and **14**D are a plan view, a side view, a front view, and a bottom view, respectively, of a base body **14** used in the light emitting device according to the fourth embodiment; and FIGS. **14**E and **14**F are cross-sectional views of the base body **14** taken at line **14**E-**14**E and line **14**F-**14**F, respectively, in FIG. **14**A.

As in the first embodiment, a resin body **20** of the base body **14** includes sandwiching portions **21***c* and **21***d*, interconnecting portions **21***e* and **21***f*, and an isolation section **21***j*. Fiber members **40** are only placed in the sandwiching portions **21***c* and **21***d*. Each fiber member **40** includes a first fiber portion **40***a* and a second fiber portion **40***b*. The first fiber portion **40***a* is placed above two extending portions **31***h* and an extending portion **32***h*, whereas the second fiber portion **40***b* is placed below the two extending portions **31***h* and the extending portion **32***h*. In between the two extending portions **31***h* and between the extending portions **31***h* and **32***h*, the first fiber portion **40***a* and the second fiber portion **40***b* are engaged with each other. More specifically, in between the two extending portions **31***h* and between the extending portions **31***h* and **32***h*, the first fiber portion **40***a* is located below the second fiber portion **40***b*, and the second fiber portion **40***b* is located above the first fiber portion **40***a*, such that the first fiber portion **40***a* and the second fiber portion **40***b* intertwine each other.

Since the base body **14** includes the fiber members **40**, the strength of the base body **14** is enhanced, as in the first embodiment. Moreover, since the first fiber portion **40***a* and the second fiber portion **40***b* intertwine each other, the first fiber portion **40***a* and the second fiber portion **40***b* are less likely to become detached from the resin body **20**, even if the end faces of the first fiber portion **40***a* and the second fiber portion **40***b* may be exposed at an outer lateral face **10***e* and an outer lateral face **10***f*.

The aforementioned placement of the fiber members **40** can be achieved by for example, using a sewing machine in order to place the first fiber portions **40***a* and the second fiber portions **40***b* on the lead frame **204**. FIG. **15**A is an upper plan view of the fiber members **40** being placed on the lead frame **204** for obtaining a resin-attached lead frame in which the base bodies **14** are integrated; and FIG. **15**B is a cross-sectional view of the lead frame **204** taken at line **15**B-**15**B in FIG. **15**A. In the lead frame **204**, each first conductive subportion **231** (corresponding to the first conductive member **31**) is connected to the first conductive subportion **231** of an adjacent conductive portion **230** along the y axis direction by two connecting portions **231***h* (corresponding to the extending portions **31***h*). Moreover, each second conductive subportion **232** (corresponding to the second conductive member **32**) is connected to the second conductive subportion **232** of an adjacent conductive portion **230** along they axis direction by a connecting portion **232***h* (corresponding to the extending portion **32***h*).

The first fiber portions **40***a* and the second fiber portions **40***b* are placed on both sides of each column of plural sets of conductive members **30** arranged along the x axis direction. Each first fiber portion **40***a* is placed above two connecting portions **231***h* and a connecting portion **232***h*, whereas each second fiber portion **40***b* is placed below the two connecting portions **231***h* and the connecting portion **232***h*. Between the two connecting portions **231***h* and between the connecting portions **231***h* and **232***h*, the first fiber portion **40***a* is located below the second fiber portion **40***b*, and the second fiber portion **40***b* is located above the first fiber portion **40***a*, such that the first fiber portion **40***a* and the second fiber portion **40***b* intertwine each other.

The aforementioned placement of the first fiber portions **40***a* and the second fiber portions **40***b* can be achieved by, while utilizing the first fiber portions **40***a* and the second fiber portions **40***b* respectively as an upper thread and a lower thread, for example, using a sewing machine for industrial use to yield the first fiber portions **40***a* and the second fiber portions **40***b* in a manner of sewing the two connecting portions **231***h* and the connecting portions **232***h* along the x axis direction. By allowing the first fiber portion **40***a* and the second fiber portion **40***b* to intersect each other between connecting portions, the fiber members **40** can be stably placed on the lead frame **204**. This facilitates handling of the lead frame **204** having the fiber members **40** placed thereon.

Fifth Embodiment

A fifth embodiment of a light emitting device according to the present disclosure will be described. The light emitting device according to the fifth embodiment is identical to the light emitting device according to the first embodiment, except mainly for a base body having a different structure. Therefore, the structure of the base body will be mainly described.

FIGS. **16**A, **16**B, **16**C, and **16**D are a plan view, a side view, a front view, and a bottom view, respectively, of the light emitting device **105** according to the fifth embodiment; and FIG. **16**E is a cross-sectional view of the light emitting device **105** taken at line **16**E-**16**E in FIG. **16**A. FIGS. **17**A, **17**B, **17**C, and **17**D are a plan view, a side view, a front view, and a bottom view, respectively, of a base body **15** used in the light emitting device **105** according to the fifth embodiment; and FIGS. **17**E and **17**F are cross-sectional views of the base body **15** taken at line **17**E-**17**E and line **17**F-**17**F, respectively, in FIG. **17**A.

The base body **15** has no recesses, and its upper face **10***a* and lower face **10***b* are flat. As a result, a sealing member **60** is located so as to cover the entire upper face **10***a*. Moreover, a first conductive member **31** and a second conductive member **32** are different from those of the light emitting device according to the first embodiment. Except for its four round corners, the edge of an upper face **31***a* of the first conductive member **31** consists of: a long straight line; a short straight line which is perpendicular to the long straight line; a medium-lengthed straight line which is parallel to the long straight line and perpendicular to the short straight line; and an inwardly-convex curve. Except for its three round corners, the edge of an upper face **32***a* of the second conductive member **32** consists of: a long straight line; a short straight line; and an outwardly-convex curve. The shape of a resin body **20** is rectangular in top view. Therefore, an isolation section **26***j* located between the first conductive member **31** and the second conductive member **32** has a curve shape, and is located, in top view, so as to extend between two adjacent sides among the four sides of the rectangle. The resin body **20** includes sandwiching portions **26***c* and **26***f* and interconnecting portions **26***e* and **26***d*. Even though the sandwiching portions **26***c* and **26***f* sandwich the isolation section **26***j*, the sandwiching portion **26***c* and the sandwiching portion **26***f* are located on two adjacent sides of the rectangle. The direction that the sandwiching portion **26***c* extends and the direction that the sandwiching portion **26***f* extends are orthogonal to each other; and since the sandwiching portions **26***c* and **26***f* are connected to each other at one end, the sandwiching portions **26***c* and **26***f* together present an "L" shape. Moreover, the interconnecting portion **26***e* and the interconnecting portion **26***d* are located on two adjacent sides of the rectangle. The direction that the interconnecting portion **26***e* extends and the direction that the interconnecting portion **26***d* extends are orthogonal to each other; and since the interconnecting portions **26***e* and **26***d* are connected at one end to each other, the interconnecting portions **26***e* and **26***d* together present an "L" shape. As the two "L" shapes are connected to each other at both ends, they together present the rectangular shape.

The sandwiching portions **26***c* and **26***f* have adjoining regions **26***cr* and **26***fr*, respectively, each adjoining the isolation section **26***j*.

Each fiber member **40** is located inside the adjoining region **26***cr* or the adjoining region **26***fr* of at least one of the sandwiching portions **26***c* and **26***f*, and, inside the respective adjoining region **26***cr* or **26***fr*, extends in a direction which is non-orthogonal to the direction that the sandwiching portion **26***c* or **26***f* extends.

In the first conductive member **31**, four extending portions **31***h* are provided, such that an end face of one extending portion **31***h* is exposed at each of an outer lateral face **10***c* and an outer lateral face **10***e*. On the other hand, end faces of two extending portions **31***h* are exposed at an outer lateral face **10***d*. The second conductive member **32** includes two extending portions **32***h*, such that an end face of one extending portion **32***h* is exposed at each of the outer lateral face **10***c* and an outer lateral face **10***f*.

In the present embodiment, fiber members **40** are located inside both of the adjoining regions **26***cr* and **26***fr* of the sandwiching portions **26***c* and **26***f* More specifically, the base body **15** includes four fiber members **40**, which are respectively embedded inside the sandwiching portions **26***c* and **26***f* and the interconnecting portions **26***e* and **26***d*, along the respective directions that the sandwiching portions **26***c* and **26***f* and the interconnecting portions **26***e* and **26***d* extend. Since the fiber members **40** are embedded along the directions that the sandwiching portions **26***c* and **26***f* extend, as in the first embodiment, the strength of the base body **15** is enhanced in the adjoining regions **26***cr* and **26***fr* of the sandwiching portions **26***c* and **26***f* being connected to the isolation section **26***j*, where stress is likely to concentrate.

A resin-attached lead frame in which the base bodies **15** are integrated can be produced in a similar manner to the first embodiment. By using the resin-attached lead frame having been produced, a light emitting device **105** can be produced in a similar manner to the first embodiment. Unlike in the first embodiment, though, the latticework portion of the resin-attached lead frame **155** has no recesses.

FIG. **18** shows enlarged the placement of the lead frame **205** and the fiber members **40** in the resin-attached lead frame in which the base bodies **15** are integrated. In the lead frame **205**, conductive portions **230** are arranged in a two-dimensional array along the x axis direction and the y axis direction. Each first conductive subportion **231** and each second conductive subportion **232** are connected via a connecting portion **235***h* extending along the x axis direction. Sets of the first conductive subportion **231** and the second conductive subportion **232** being connected to each other are arranged along the x axis direction, via gaps in which the isolation sections **26***j* are placed.

Each first conductive subportion **231** is connected to an adjacent first conductive subportion **231** on the right side along the y axis direction by a connecting portion **231***h*, and connected to an adjacent second conductive subportion **232** on the right side along the y axis direction by a connecting portion **236***h*.

The fiber members **40** are placed so as to fit around the respective conductive portions **230**. Specifically, two fiber members **40** extending along the x axis direction are placed so that a column of conductive portions **230** arranged along the x axis direction is interposed therebetween. Moreover, two fiber members **40** extending along the y axis direction are placed so that a row of conductive portions **230** arranged along the y axis direction is interposed therebetween. Each of such fiber members **40** may be an independent monofilament or a bundle of fibers, or they may together constitute a knotless net.

Using the resin-attached lead frame **155**, a light emitting device **105** can be produced by a method similar to the method which was described in the first embodiment.

A light emitting device according to the present disclosure can be suitably used for various light sources, e.g., light sources for illumination purposes, light sources for various indicators, light sources for displays, light sources in the backlights of liquid crystal displays, traffic lights, onboard parts for vehicles, channel letters for signage use, and so on.

While exemplary embodiments of the present invention have been described above, it will be apparent to those skilled in the art that the disclosed invention may be modified in numerous ways and may assume many embodiments other than those specifically described above. Accordingly, it is intended by the appended claims to cover all modifications of the invention that fall within the true spirit and scope of the invention.

What is claimed is:

1. A light emitting device comprising:

a base body including two conductive members each having an upper face and a lower face, a resin body covering a part of each conductive member, and a fiber member placed inside the resin body, a part of the upper face of each conductive member being exposed from the resin body at an upper side of the base body, and a part of the lower face of each conductive member being exposed from the resin body at a lower side of the base body; and

a light-emitting element electrically connected to the two conductive members, wherein,

the resin body includes an isolation section located between the two conductive members, and includes a pair of sandwiching portions sandwiching the isolation section;

the fiber member has a length which is greater than a distance between the two conductive members, and is located at least in an adjoining region of at least one of the pair of sandwiching portions, the adjoining region adjoining the isolation section; and,

in the adjoining region, the fiber member extends in a direction which is non-orthogonal to a direction in which the pair of sandwiching portions extend,

wherein, each sandwiching portion has an outer lateral face;

the two conductive members each include an extending portion, the extending portion extending toward the outer lateral face of one of the pair of sandwiching portions and having an end face which is exposed at said outer lateral face; and

the fiber member includes a first fiber portion located downward of the extending portion.

2. The light emitting device of claim **1**, wherein the fiber member further includes a second fiber portion located upward of the extending portion.

3. The light emitting device of claim **2**, wherein the first fiber portion and the second fiber portion come in contact with each other in between the extending portions of the two conductive members.

4. The light emitting device of claim **1**, wherein, the resin body includes a pair of interconnecting portions interconnecting the sandwiching portions; and each of the pair of interconnecting portions has an outer lateral face, an end face of the fiber member being exposed at the outer lateral face of one of the pair of interconnecting portions.

5. The light emitting device of claim **1**, wherein an end face of the fiber member is located inside the resin body.

6. The light emitting device of claim **2**, wherein, the resin body includes a pair of interconnecting portions interconnecting the sandwiching portions; and each of the pair of interconnecting portions has an outer lateral face, an end face of the fiber member being exposed at the outer lateral face of one of the pair of interconnecting portions.

7. The light emitting device of claim **2**, wherein an end face of the fiber member is located inside the resin body.

8. The light emitting device of claim **3**, wherein, the resin body includes a pair of interconnecting portions interconnecting the sandwiching portions; and each of the pair of interconnecting portions has an outer lateral face, an end face of the fiber member being exposed at the outer lateral face of one of the pair of interconnecting portions.

9. The light emitting device of claim **3**, wherein an end face of the fiber member is located inside the resin body.

10. A resin-attached lead frame, comprising:

a lead frame;

a resin member;

a plurality of fiber members; and

a plurality of additional fiber members,

wherein the lead frame includes:

a plurality of conductive portions arrayed along a first direction and a second direction which intersects the first direction, each conductive portion having an upper face and a lower face in relation to a third direction which is perpendicular to the first direction and the second direction, and each conductive portion including first and second conductive subportions in a plane containing the first direction and the second direction, the first and second conductive subportions being arranged along the first direction and spaced apart from each other by a gap; and

a plurality of connecting portions connecting between the plurality of conductive portions along the first direction and along the second direction,

wherein the resin member includes:

a plurality of isolation portions each placed in the gap between the first and second conductive subportions; and

a latticework portion placed between the plurality of conductive portions so as to surround each conductive portion while leaving a part of the upper face and a part of the lower face of the conductive portion exposed, the latticework portion including a plurality of first portions extending along the first direction and a plurality of second portions extending along the second direction,

wherein the plurality of fiber members each has a length which is greater than a distance between the first and second conductive subportions,

wherein, in the resin member, one end of each isolation portion is connected to a corresponding one of the plurality of first portions,

wherein one of the plurality of fiber members is located at least in an adjoining region of the first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction, and

wherein,

the latticework portion of the resin member includes a plurality of second portions extending along the second direction;

the plurality of additional fiber members are embedded in the plurality of second portions; and

the fiber members and the plurality of additional fiber members constitute a knotless net.

11. The resin-attached lead frame of claim **10**, wherein, the lead frame includes an outer frame portion surrounding the plurality of conductive portions arrayed along the first and second directions, and a plurality of hooks located inside the outer frame portion; and

the plurality of fiber members are engaged on and supported by the plurality of hooks.

12. The resin-attached lead frame of claim **10**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

13. The resin-attached lead frame of claim **11**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

14. A resin-attached lead frame, comprising:

a lead frame;

a resin member; and

a plurality of fiber members,

wherein the lead frame includes:

a plurality of conductive portions arrayed along a first direction and a second direction which intersects the first direction, each conductive portion having an upper face and a lower face in relation to a third direction which is perpendicular to the first direction and the second direction, and each conductive portion including first and second conductive subportions in a plane containing the first direction and the second direction, the first and second conductive subportions being arranged along the first direction and spaced apart from each other by a gap; and

a plurality of connecting portions connecting between the plurality of conductive portions along the first direction and along the second direction,

wherein the resin member includes:

a plurality of isolation portions each placed in the gap between the first and second conductive subportions; and

a latticework portion placed between the plurality of conductive portions so as to surround each conductive portion while leaving a part of the upper face and a part of the lower face of the conductive portion exposed, the latticework portion including a plurality of first portions extending along the first direction and a plurality of second portions extending along the second direction,

wherein the plurality of fiber members each has a length which is greater than a distance between the first and second conductive subportions,

wherein, in the resin member, one end of each isolation portion is connected to a corresponding one of the plurality of first portions,

wherein one of the plurality of fiber members is located at least in an adjoining region of the first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction,

wherein, the lead frame includes an outer frame portion surrounding the plurality of conductive portions arrayed along the first and second directions, and a plurality of hooks located inside the outer frame portion; and

the plurality of fiber members are engaged on and supported by the plurality of hooks.

15. The resin-attached lead frame of claim **14**, wherein,

in the resin member, another end of each isolation portion is connected to another one of the plurality of first portions; and

another one of the plurality of fiber members is located at least in an adjoining region of the other first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the another one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction.

16. The resin-attached lead frame of claim **15**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

17. The resin-attached lead frame of claim **14**, further comprising a plurality of additional fiber members,

wherein,

the latticework portion of the resin member includes a plurality of second portions extending along the second direction;

in the resin member, another end of each isolation portion is connected to the second portion; and

one of the plurality of additional fiber members is located at least in an adjoining region of the second portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of additional fiber members extending within the adjoining region in a direction which is non-orthogonal to the second direction.

18. The resin-attached lead frame of claim **17**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

19. The resin-attached lead frame of claim **14**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

20. The resin-attached lead frame of claim **14**, wherein, the plurality of connecting portions of the lead frame include first connecting portions each connecting the first conductive subportion of a conductive portion to the second conductive subportion of an adjacent conductive portion along the first direction, and second connecting portions each connecting the first and second conductive subportions of a conductive portion to the first and second conductive subportions of an adjacent conductive portion along the second direction; each fiber member includes a first fiber portion that is located above the corresponding second connecting portion and a second fiber portion located below the corresponding second connecting portion.

21. The resin-attached lead frame of claim **20**, wherein,

in the resin member, another end of each isolation portion is connected to another one of the plurality of first portions; and

another one of the plurality of fiber members is located at least in an adjoining region of the other first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the another one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction.

22. The resin-attached lead frame of claim **21**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

23. The resin-attached lead frame of claim **20**, further comprising a plurality of additional fiber members,

wherein, the latticework portion of the resin member includes a plurality of second portions extending along the second direction;

in the resin member, another end of each isolation portion is connected to the second portion; and

one of the plurality of additional fiber members is located at least in an adjoining region of the second portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of additional fiber members extending within the adjoining region in a direction which is non-orthogonal to the second direction.

24. The resin-attached lead frame of claim **23**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

25. The resin-attached lead frame of claim **20**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

26. The resin-attached lead frame of claim **20**, wherein,

the latticework portion of the resin member includes a plurality of second portions extending along the second direction; and

in between second connecting portions, the first fiber portion and the second fiber portion are adhesively bonded to each other.

27. The resin-attached lead frame of claim **26**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

28. A resin-attached lead frame, comprising:

a lead frame;

a resin member; and

a plurality of fiber members,

wherein the lead frame includes:

a plurality of conductive portions arrayed along a first direction and a second direction which intersects the first direction, each conductive portion having an upper face and a lower face in relation to a third direction which is perpendicular to the first direction and the second direction, and each conductive portion including first and second conductive subportions in a plane containing the first direction and the second direction, the first and second conductive subportions being arranged along the first direction and spaced apart from each other by a gap; and

a plurality of connecting portions connecting between the plurality of conductive portions along the first direction and along the second direction, wherein the resin member includes:

a plurality of isolation portions each placed in the gap between the first and second conductive subportions; and

a latticework portion placed between the plurality of conductive portions so as to surround each conductive portion while leaving a part of the upper face and a part of the lower face of the conductive portion exposed, the latticework portion including a plurality of first portions extending along the first direction and a plurality of second portions extending along the second direction,

wherein the plurality of fiber members each has a length which is greater than a distance between the first and second conductive subportions,

wherein, in the resin member, one end of each isolation portion is connected to a corresponding one of the plurality of first portions,

wherein one of the plurality of fiber members is located at least in an adjoining region of the first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction, and

wherein,

the plurality of connecting portions of the lead frame include

first connecting portions each connecting the first conductive subportion of a conductive portion to the second conductive subportion of an adjacent conductive portion along the first direction,

second connecting portions each connecting the first and second conductive subportions of a conductive portion to the first and second conductive subportions of an adjacent conductive portion along the second direction; and

each fiber member includes a first fiber portion that is located above the corresponding second connecting portion and a second fiber portion located below the corresponding second connecting portion.

29. The resin-attached lead frame of claim **28**, wherein,

in the resin member, another end of each isolation portion is connected to another one of the plurality of first portions; and

another one of the plurality of fiber members is located at least in an adjoining region of the other first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the another one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction.

30. The resin-attached lead frame of claim **28**, further comprising a plurality of additional fiber members,

wherein, the latticework portion of the resin member includes a plurality of second portions extending along the second direction;

in the resin member, another end of each isolation portion is connected to the second portion; and

one of the plurality of additional fiber members is located at least in an adjoining region of the second portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of additional fiber members extending within the adjoining region in a direction which is non-orthogonal to the second direction.

31. The resin-attached lead frame of claim **28**, wherein, the latticework portion of the resin member includes a plurality of second portions extending along the second direction;

in between second connecting portions, the first fiber portion and the second fiber portion are adhesively bonded to each other; and

each of the plurality of second portions of the latticework portion has the first fiber portion and the second fiber portion located therein, such that the first fiber portion and the second fiber portion are placed between a plurality of cut lines extending along the second direction but do not intersect the cut lines.

32. The resin-attached lead frame of claim **28**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

33. The resin-attached lead frame of claim **29**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

34. The resin-attached lead frame of claim **30**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

35. The resin-attached lead frame of claim **31**, wherein the plurality of fiber members are impregnated with a resin, and the resin has been cured.

36. A resin-attached lead frame, comprising:

a lead frame;

a resin member; and

a plurality of fiber members,

wherein the lead frame includes:

a plurality of conductive portions arrayed along a first direction and a second and direction which intersects the first direction, each conductive portion having an upper face and a lower face in relation to a third direction which is perpendicular to the first direction and the second direction, and each conductive portion including first and second conductive subportions in a plane containing the first direction and the second direction, the first and second conductive subportions being arranged along the first direction and spaced apart from each other by a gap; and

a plurality of connecting portions connecting between the plurality of conductive portions along the first direction and along the second direction,

wherein the resin member includes:

a plurality of isolation portions each placed in the gap between the first and second conductive subportions; and

a latticework portion placed between the plurality of conductive portions so as to surround each conductive portion while leaving a part of the upper face and a part of the lower face of the conductive portion exposed, the latticework portion including a plurality of first portions extending along the first direction and a plurality of second portions extending along the second direction,

wherein the plurality of fiber members each has a length which is greater than a distance between the first and second conductive subportions,

wherein, in the resin member, one end of each isolation portion is connected to a corresponding one of the plurality of first portions,

wherein one of the plurality of fiber members is located at least in an adjoining region of the first portion to which each isolation portion is connected, the adjoining region adjoining the isolation portion, the one of the plurality of fiber members extending within the adjoining region in a direction which is non-orthogonal to the first direction, and

wherein the one fiber member is located downward of at least one of the plurality of connecting portions.

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